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Editorial Notes

Coal Prices

It is probable that many readers of the "JOURNAL" will have seen an article in the issue of the *Financial Times* for March 10 entitled "Higher Coal Prices and the Gas Industry." The writer of the article appears to deplore the fact that in their speeches at recent annual meetings the chairmen of many gas companies have felt it necessary to call attention to the substantial increase in coal prices caused by the coal-selling schemes. It is suggested that such statements are calculated to cause undue alarm to shareholders and consumers. That such increases have taken place, or will take place when existing contracts expire, the writer of the article does not appear to deny, but he pleads (as the lawyers say) the following facts in mitigation:

First, that in the past public utilities have purchased coal "at prices far below the average cost of production;" secondly, that the selling schemes are necessary in order "to ensure a level of values which would enable both miners and colliery investors to receive a reasonable reward for their share in the industry;" and, thirdly (which is the chief burden of his song), that owing to the fact that the existing market price obtainable for coke and other residuals is high, gas undertakers have not experienced undue hardship by reason of the increase in coal prices. Certain figures indicating the price obtained for coke by several of the larger gas companies are given, and the general conclusion is drawn that the Gas Industry has no real grievance with the coal-selling schemes, which have been in operation since August, 1936.

The arguments to which we have referred above are not new, and it is not necessary for us to weary our readers by repeating the reasons which make it impossible for the Gas Industry to accept them. No generally accepted figures have ever been produced to prove the oft-repeated statement that until August, 1936, the Gas Industry purchased its coal at prices lower than the cost of production. Those who purchased coal for the Gas Industry acted as any practical business men would do, and purchased the coal most suitable for their needs in the lowest British market. The colliery owners were more than ready sellers, and the fair payment of their workpeople and the remuneration on their capital were their affair and not that of the coal consumers. What would be thought of a consumer of gas who intimated to his local gas company that he did not consider that the price which that company were demanding for their gas would enable them to pay large enough dividends or high enough wages, and that he must therefore insist upon paying more for his gas than the company had quoted? It is only necessary to apply to the Gas Industry the arguments put forward by the coal owners in regard to their industry to appreciate their absurdity.

The article, however, entirely misunderstands the case of the public utilities against the Coal Mines Act, 1930, and the selling schemes made thereunder. No one in the Gas Industry wishes to deny to miners or shareholders in coal mines fair treatment; indeed, such treatment is universally admitted to be in the national interest. The objections which the large consumers have put forward relate to method rather than to matter—it is the demand for due safeguards. Although the Industry has no love for central selling, it has never objected to it but has asked merely that there shall be some body, having the confidence of the public as well as of the Industry, to whom it can appeal against an unfair exercise of monopolistic powers. The present Committees of Investigation, even with the modifications made in their composition and procedure by the present Coal Bill, do not command that confidence. There are many vital questions, such as that relating to price and discrimination, with which they have no power to deal. Further, such Committee would in law be bound and regulated by the Act under which they are constituted, and it is difficult to see how they could possibly give effect to vague assurances given by the coalowners to the Board of Trade.

When the question is regarded in this light it becomes plain that the price of coke and residuals is immaterial—it is a fluctuating affair and not permanent, like the Coal Selling Schemes. The question is not whether gas companies are at the moment out of pocket—important as that question may be to the individual companies—but whether there is existing at present suitable machinery for testing whether the price demanded by monopolistic selling schemes is fair and reasonable. In our view it is impossible to answer that question in the affirmative. The present position under which large consumers are expected to pay whatever the coalowners like to demand is intolerable. If the prices demanded for coal are to-day fair and reasonable, then the coalowners have nothing to fear from an impartial enquiry. It is the opposition to the incorporation in the Coal Bill of provisions necessary to give effect to such a reasonable demand that creates suspicion.

Coke Research

THE growing scope of the work undertaken by the Midland Coke Research Committee is indicated in the Committee's Report of Progress during 1937. In that year membership of the Committee was made available to coke-making firms in South Wales and to coke oven construction companies. Several new members have been elected and a further extension of membership is expected during the present year. A notable feature of the report is a list of published Papers, seven in number, of which three deal with the standardization of tests—the determination of the swelling property of coal, the determination of real specific gravity, and the critical air blast of coke. Those who have studied these Papers, which amplify the bare statements of progress in the annual report, will appreciate how thorough is the work on which the standardization is based. A central research organization is, of course, peculiarly well fitted to carry out this type of work for industry, where the time, opportunity, or inclination to investigate a method of testing rarely arise. Much of the research is obviously of special local interest to the makers of coke in the Midland area and the users of that coke. Among the programmes of more general interest is the work on the classification of coal, on which enlightenment would be generally welcomed, a fundamental study of the carbonization process, and work on the resistance of beds of coke and of individual pieces of coke to the passage of air. Research on the use of coke for domestic purposes includes a study of alkali activation and of vertical retort coke, which shows that the Committee has a broad basis for its activities.

We have previously recorded in these columns that in the Midland area there has been a shortage of small coal of coking quality. In many cases deficiencies of coking slack have been made up by coking nut coal, but nut coal was found to yield a coke inferior to that yielded by slack coal from the same colliery. The Midland Coke Research Committee investigated the reasons for this. By coking, after crushing, the different commercial grades of coal from one colliery it was found that the "beans" yielded the weakest coke, the quality of coke then improving with the size of the nut coal coked. Even with large coal, however, the coke was still inferior to that made from slack. It was found that the shatter indices of the cokes made from sizes larger than slack were directly proportional to the amount of durain, which was present to the greatest extent in large coal and the least in "beans." It was possible to account for the superior quality of coke made from slack by its durain content, but, in addition, slack contains fusain which appeared to account for the improved quality of coke. Addition of hand-picked fusain to the small nut coals gave a coke equal in quality to that made from slack. A series of tests in which coke dust was added to "beans" of varying durain and fusain content and slack showed the effect of the coke dust addition to be the same in all cases. During the year an attempt was made to find a better substitute for fusain than crushed high-temperature coke, which is unsatisfactory with some coals. This phase of the work, it should be mentioned, was in co-operation with the Fuel Research Station and the Gas Light and Coke Company, who made two series of semi-cokes with different volatile contents, and it was found that the addition of semi-cokes was not so liable to increase the abradability of the coke as was the addition of high-temperature coke. Work is still in progress on this problem. Grinding cost, of course, enters into the question, and the coarsest size of material made by undercarbonizing coke oven charges which can be used without influencing the abradability adversely is being determined.

Another interesting investigation carried out during 1937 was an examination of coals reputed to cause damage to oven walls due to the development of excessive plasticity, which causes difficulty in pushing the charge. It has, however, been found that coals which develop excessive plasticity tend to give erroneous results in large and small scale swelling-pressure tests. A systematic investigation of such tests is being made, but it has already been shown some coals have wrongly been labelled dangerous to oven walls. We have mentioned the work done on alkali activation of coke. In this connexion a Staffordshire coal to which 0·5% of sodium carbonate and 2% of ground limestone was added gave a coke (with 2-hour undercarbonization of the charge) much more reactive than that from the coal alone. In an open grate the coke could be ignited with only 4 to 6 cu.ft. of gas. Though the properties of coke in regard to its use in blast furnaces and for other metallurgical purposes have been the main concern of the Committee, we are glad that the use of coke for domestic purposes is now receiving attention.

200 B.Th.U. Gas

IN an article bearing the title "The Future Orientation of the Gas Industry," which we published in the "JOURNAL" for Jan. 5, a contributor discussed the possibilities of producing and distributing a low-grade gas having a calorific value of the order of 200 B.Th.U. per cu.ft. Commenting on that article we suggested that, interesting as it undoubtedly was—and it is good that from time to time we should have our thoughts stimulated—it did not carry us much further towards the goal of cheaper gas. The Author reproduced authoritative figures given to The Institution of Gas Engineers by Mr. Stewart and Mr. Hunter, of the Gas Light and Coke Company, and published in the Institution's Transactions. These figures, which relate to the cost of gas production in horizontal retorts, continuous verticals, intermittent verticals, and coke ovens, were, as we pointed out in our issue for Jan. 19, substantiated with clarity and in great detail. The Author then went on to ask whether there is not some simpler, and cheaper method of making gas, and explained that an examination of the possibilities had led him to the view that an internally heated low-temperature retort *plus* a producer gas generator, the two forming a single unit, would be the simplest and cheapest of all. Without substantiating his assumption by fact or figure, he put forward the statement that "in a plant of this type working under reasonable average conditions the cost of making 200 B.Th.U. purified gas into holder is of the order of 1d. per therm . . . under really favourable conditions costs can be still lower."

Suggesting in our comment on Jan. 19 that obviously the Author would not expect gas engineers to accept this statement, unsupported as it was by any evidence, we expressed disagreement with the view that suitable slightly-caking coal could be delivered in London at a cost below that of the coals at present being carbonized in "orthodox" plants, and observed that if a make of 180 therms of low-grade gas per ton of coal was envisaged this would mean, in coal cost alone, 1¼d. per therm of gas made. We also quoted the figure given by Mr. Hunter for the cost of producer gas made in mechanical producers at Beckton with small coke at 15s. per ton and breeze at 5s. per ton. This was 1·26d. per therm. We mentioned, *en passant*, the millions of pounds of capital

expended on equipment suitable for the gas now supplied and unsuitable for gas having a calorific value of 200 B.Th.U.

On later pages "M.Inst.Gas E.," the Author of the article in question, replies to the criticisms we made and also to those in a letter published in our correspondence columns. In this reply, which embodies further thoughts on the subject, he remarks that the absence of adverse comment from gas engineers and constructional firms suggests that they have worked out the figures for themselves and have been satisfied. They may have worked these figures out, but they may have been satisfied with a conclusion the reverse of that arrived at by the Author. However, in the article in to-day's "JOURNAL" "M.Inst.Gas E." does quite a bit of calculating in demonstrating, at any rate to his own satisfaction, that 200 B.Th.U. gas can be made for less than a penny per therm. His figures will be studied with critical eye; and we suggest that they are very much open to criticism.

He states that a plant for the production of low calorific value gas of an annual capacity of 2,000,000 therms would cost £30,000. "No doubt," he says, "there will be critics who will ask for proof of this unsupported statement also, but they will not have their desire gratified." This is not very helpful, since it has such a vital bearing on the issue. We do not think we are wrong in assuming that, in setting out his case, the Author has put forward a capital figure based on the output of the plant when working to capacity, without taking into consideration the vast fluctuations in demand which occur week by week and even day by day. If this is so, then to meet fluctuations from, say, 10 million cu.ft. to 25 million cu.ft. per day, which we know do occur, he would have to provide additional plant to cope with the variations in demand, which would add to capital cost, to wages, and to wear and tear. Then it will be noted that, in arriving at a cost per therm below 1d., the Author assumes that the oil made in the plant would command a figure of 4d. a gallon, and that the coke would fetch a price of 25s. a ton with the cost of coal to the plant at 20s. 9d. per ton. The coke produced, he maintains, "is very much better for domestic use" than is that from high-temperature retorts, and "will therefore command a better price." It is, he says, as free burning as Coalite. It will be noted, however, that the volatile matter, at 3%, is very much lower than that of Coalite.

Then, of course, it is essential to consider the volume of gas to be purified—two and a half times more for a given heat content than gas of 500 B.Th.U. Admitting that the capital and running cost of purifying plant do not increase in direct proportion to the volumetric capacity, extra capital cost and extra maintenance and running cost are involved. On this question the Author states that "methods are known for dealing with large volumes of gas that are considerably cheaper than oxide purifiers. . . . There are signs that the oxide purifier will in any case be superseded ere long by plant that savours less of the dark ages." The Gas Industry will, we feel, find it difficult to interpret this cryptic message. Then, we think it will be agreed that any given size of meter is capable of registration of more therms with a high-grade gas than with a low, and that distribution of a gas of the type envisaged by "M.Inst.Gas E." would involve a large replacement of meters on the district and a consequent increase in maintenance per therm sold. The cost of governors, which a supply of such gas would necessitate, would also be no small item of expenditure. Finally, it will be noted that the Author suggests that those who do not see eye to eye with him should visit Nuneaton to inspect the plant making 200 B.Th.U. gas. In this regard it should, we think, be recorded that the price at which gas is sold there ranges from 3·5d. to 15·8d. per therm, the latter figure not being particularly low.

Gas Sales and Coke

IN the "JOURNAL" for Jan. 12 we commented on the Presidential Address of Mr. H. Wood, of the Australian Gas Light Company, which he delivered to the Australian Gas Institute. We referred particularly to his policy in marketing coke. Now his view is that in every instance in which gas is unable to obtain a potential, or retain an existing, consumer on account of cost, the Gas Industry should hold the field against all comers by taking advantage of what he termed its "most valuable possession"—the ability to supply both gas and coke. We contrasted this policy with the opinion expressed by Mr. C. F. Broadhead, of Melbourne, in his Paper at the Institution Meeting last June that the domestic coke field should be abandoned, with the possible exception of blocks of flats, where labour has to be employed in any case. Mr. Wood spoke of the incomes of the vast majority, indicating that the amount of money available for spending on fuel was limited—that cost was a dominant factor. He said that in Australia 80% of the population was in receipt of an income of less than £5 per week and 78% of less than £4 per week.

In a letter in the "JOURNAL" to-day Mr. C. F. Broadhead criticizes these figures on the score that they are out of date. The average gasworker's wage, he states, is more than £5 per week. Apart from this, however, he maintains that income in Australia bears little relation to potential gas or coke consumption. Prior claims on wages, he remarks, are motor cars, wireless, racing, and the cinema. He continues: "It would, one might confidently suggest, be much easier to divert a portion of the money flowing in these directions to the use, domestically, of a modern fuel such as gas rather than to the utilization of such a cumbersome commodity as coke."

May we suggest that, if the question of price does not enter into the matter, exactly the same argument applies to a newer and also more expensive heating agent than gas. Let it be said at once that we appreciate that conditions in Melbourne are very different from those obtaining in this ountry, and, of course, we agree with Mr. Broadhead that the solid fuel fire is a cumbrous method—"incredibly cumbrous" as Mr. E. V. Evans defined it recently—of obtaining heat. No one is more anxious than we are to see the solid fuel fire displaced by gas. But we feel sure that cost is a factor of first importance and that in general the public spends money on fuel most reluctantly. When the public learn to appreciate the advantages to be gained by using more gas in their homes—and it is up to the Gas Industry to impress these advantages on the minds of the public—then gas sales will vastly expand. The first step towards this appreciation must, however, be the offer of cheap gas, and if the cost of gas can be lowered, as at the moment in Great Britain it is so reduced, by the efficient marketing of coke, we see nothing amiss with the policy of selling both fuels, and can only praise, not blame, Mr. Wood in his plan of installing complete coke screening plant which—we quote from his Address—"will compare more than favourably with plants observed abroad."

The lower the cost of gas manufacture and distribution, the more effective will be the attractive tariffs which should now be regarded as essential to the development of gas business. And if, as Mr. Wood said, the future prospects of coke sales

in his area of supply are excellent, we find it hard to agree with the view of Mr. A. E. Hutchison that the policy of selling coke as well as gas "is akin to slow suicide." Mr. Hutchison is Controller of Sales to the Australian Gas Light Company, and we quote this opinion from the concluding sentence of Mr. Broadhead's letter.

"Staggering"

When it was suggested by Mr. H. C. Burton at the recent meeting of the London and North-Eastern Railway Company that "a proper spirit of service on the railways would best be obtained by introducing some system of co-partnership," the reply of the Chairman (Mr. William Whitelaw) is reported to have been that "they all agreed that co-partnership, where it was practicable, was admirable, but he must admit that, although he had thought the question out, he knew of no practical way in which full co-partnership could be obtained in the railway service." As an expert in the railway world, he should know. Ideals, of course, are not always attainable. But while, so far as Mr. Whitelaw knows, up to the present the problem of applying co-partnership has proved insoluble so far as railway services are concerned, he seems to have more hope in connexion with another problem which to some people possibly presents difficulties little less grave. This is with regard to extending the holiday period. Literally, holidays with pay in various fresh directions will prove a "movement" entailing added pressure on the railway services during the busiest period of the year, and greater demands upon the accommodation of apartment houses and boarding establishments. In big organizations, a good deal is already done in the way of extending the holiday period, but it seems that anything like a general application of the idea may present big obstacles, in spite of the feeling of Mr. Whitelaw that "it should not be beyond the combined intelligence of the various parties concerned to arrange for at least an earlier commencement of the holiday period." By all means, let us see what can be done to help the railways, and those in business at the holiday resorts, in this matter, but what might be the result? Is the "dead season" to fade away, or merely to be prolonged? And what is to become of all those people—and they are legion—who can only leave town "when everyone else is away?" Is there to be no quiet time, or is the period of (more or less) business dislocation to be extended from (say) six weeks to (say) three months? An extension of the holiday period may appeal to the community, in which case it will doubtless be tried-out on the large scale, but we fear it would prove hard for the railways and the boarding-house keepers to popularize it for their own convenience. Many important concerns in the Gas Industry have made a thorough-paced success of co-partnership, because the system is for the public good. When some years ago, gas undertakings found themselves almost inconvenienced by the extent of the mid-day Sunday cooking load, they would have failed in any endeavour to induce consumers to "stagger" their Sunday dinners!

Men Who Run London

It must have given great pleasure to those friends of Sir David Milne-Watson, Bt., who read the *Evening News* to find Mr. W. Crawford Snowden's excellent article on Sir David and his great Undertaking, the Gas Light and Coke Company, in the "Men Who Run London" series. Having related how the young barrister, David Milne-Watson, forsook the long journey to the Woolsack on an invitation to join the Gas Light and Coke Company, Mr. Snowden said Sir David did not look back. In six years he was General Manager, and, now, after thirty-eight years, he is Governor and Managing Director and the recognized leader of our Industry. A happy sidelight on Sir David's character is provided by the story of how as a child of but ten years old he landed his first trout and because it leapt about so and he did not know what else to do he sat on his captive. This and other happy incidents are related by Mr. Snowden in sketching Sir David's character—for the benefit, of course, of those who have not had the pleasure of his acquaintance. And a very fine character study it is, too; in it Mr. Snowden has supported his contentions by interesting references to the vastness and efficiency of the Gas Light and Coke Company and Sir David's own particular "baby," Watson House. The zest and enthusiasm which has marked Sir David's work characterizes also his hobbies, which include fly-fishing, shooting, travel, and gardening. His estate in Dorset includes a farm, and just as he knows the Gas Company's affairs from A to Z, Mr. Snowden observes, he knows every detail of that farm and how everything should go, and they say of him in Dorset that he is a "good gaffer"—which means they respect his knowledge. This respect, we suggest, is far from being the prerogative of the Dorsetshire man.

High Pressure Storage

In his Presidential Address to the Cornish Gas Association Mr. F. R. G. Grant gave an interesting description of the high-pressure distribution system at St. Ives, where an output of 24 million cu.ft. of gas in 1926 grew to 44 millions by 1936, and where the trunk main carrying all the gas from the works is only 8 in. in diameter. With an available holder capacity effective for distribution of only 50,000 cu.ft., pressures during periods of peak load fell "to an alarming extent," and as the demand for further supplies increased the trouble became more and more acute. Mr. Grant decided to install a complete high-pressure system as the only satisfactory means of overcoming the difficulties and to erect a high-pressure vessel of about 160,000 cu.ft. capacity at 50 lb. pressure per sq.in. Space was limited, so the choice fell on a spherical holder. This was designed, constructed, and erected by the Whessoe Foundry and Engineering Company, Ltd., and, observed Mr. Grant, "I have no hesitation in saying that it must be one of the finest pieces of work, if not the finest, of its kind which has ever been made." He pointed out that if instead of the high-pressure holder he had installed a water sealed or a waterless holder and a receiver of, say, 1,000 cu.ft. capacity, then the compressor would have had to work practically day and night. With the high-pressure holder the compressor is run only for a few hours daily, which means that compressing charges are very low—a big factor in any high-pressure scheme. As a result of this reconstruction Mr. Grant did not receive a single complaint of poor pressure during the period of greatest consumption in August last.

Lighting Provisions of the New Factory Act

A round table public discussion on the lighting provisions embodied in the New Factory Act will be held under the auspices of the Industrial Lighting Section of the Illuminating Engineering Society, at the Home Office Industrial Museum, Horseferry Road, Westminster, S.W.1, on Tuesday, March 29, 1938, at 6.30 p.m.

Speakers representing the points of view of the employer, the employee, the lighting expert, and the administration will take part, including Mr. D. Gluckstein (of Messrs. J. Lyons & Co.), Mr. H. N. Winbolt (Assistant Secretary of the Safety First Association), Dr. S. English (President of the Illuminating Engineering Society), and Mr. E. W. Murray (of the Home Office Industrial Museum).

Tickets (free) may be obtained by persons wishing to attend on application to the Secretary of the Industrial Lighting Section of the Illuminating Engineering Society (Mr. C. W. M. Phillips, the British Thomson Houston Co., Ltd., Crown House, Aldwych, W.C. 2). Early application for tickets is desirable, as accommodation is limited.

Glasgow and Edinburgh Coal Memorandum

The Glasgow and Edinburgh Corporations have prepared a joint Memorandum calling for protection in the Coal Bill now before Parliament.

The memorandum relates the experiences of municipal gas undertakings in the two cities since the introduction of quotas under the 1930 Coal Mines Act. Complaint is made that contracts for delivery of coal have not been implemented, in spite of timely notice being given of requirements and of agreement to pay higher prices. "We are of opinion," states the Memorandum, "that contracts are being ignored to an extent which was not permissible prior to the introduction of controlled selling."

For November, December, and January last the Glasgow Gas Department received delivery of 190,000 tons out of 230,000 tons ordered, a 16% shortage. Edinburgh received 71,700 tons out of 91,900 tons ordered, a 22% deficiency. Owing to short supplies of caking coals, the Departments have been forced to use other kinds, with the result that Glasgow has had a working loss of £54,000 in the last two years and Edinburgh £26,000, equal to 2d. per 1,000 cu.ft. in the selling price. The increased price of coal, ranging from 4s. to 6s. 6d. per ton, has meant an extra £140,000 for Glasgow and £60,000 for Edinburgh.

Letters to the Editor

Coke Sales in Australia

SIR,—In your issue of Jan. 12 you quote the advocacy of complete gasification in my Institution Paper in contradistinction to the views expressed by Mr. H. Wood, of Sydney, in his Presidential Address to the Australian Gas Institute, who "is going out enthusiastically for the coke market."

In support of the debatable contention that the Gas Industry possesses a great advantage in being purveyor of two smokeless fuels—one gaseous, the other in the solid form—the misleading theory is repeated that because 78% of the population in Australia is in receipt of an income of less than £4 per week the prospect of increased coke sales is excellent. Apart altogether from the fact that the figures are out of date and inaccurate (the Sydney minimum rate for gas-works labourers being £4 4s. per week, and the average gas worker's wage above £5 per week), income in Australia bears little relation to potential gas or coke consumption, prior claims on wages these days being motor cars, radios, racing, and moving pictures—and in no city more so than in Sydney. It would, one might confidently suggest, be much easier to divert a portion of the money flowing in these directions to the use, domestically, of a modern fuel such as gas rather than to the utilization of such a cumbersome commodity as coke.

Nothing could better sum up the position than the opinion expressed at the Institute Meeting by the Controller of Sales of Mr. Wood's Company (Mr. A. E. Hutchison), that such a policy is akin to slow suicide.

Yours, &c.,
C. F. BROADHEAD.

The Metropolitan Gas Company,
Melbourne, C. 1,
Feb. 25, 1938.

Gas-Works Fauna

SIR,—*Punch* to-day does not appeal to me as it did when under the Editorship of Sir Owen Seaman and when it occasionally contained an article dealing with village cricket or football written by Mr. Walter E. Tew.

It therefore gave me great pleasure to read Mr. Tew's letter regarding Gas-Works Fauna, which appeared in the "JOURNAL" for Feb. 23, and to find that he still retains his keen sense of humour and literary skill.

Now, with regard to a competition in gas-works fauna suggested in Mr. Tew's letter, I am unaware of his reserves, other than those he mentions, but I can confirm that we have had on our works all the birds and animals to which he refers—and others that he does not include—with the exception of the cuckoo, but inasmuch as we have had kingfishers and swans I think we have a winning lead over Gloucester.

Some years ago we had a brace of otters and a deer which will put us further ahead and, to settle the matter finally, there is in our Board Room a stuffed trout which weighed 8¾ lb. and which, after "breaking me," was taken two days later by another angler from the river which adjoins our works.

The fish is the only one I have had "set up." I did so as it was such a very good specimen and was caught within about two minutes' walk of my office. When my late Chairman, Mr. Okey Taylor, saw it he remarked "What a lovely fish, we must have it for the Board Room." I told him that it had cost me £3. "Never mind," he said, "we must have it for the Board Room," and on my asking why, he replied, "To show that we do not pollute the river."

Yours, &c.,
D. H. HELPS.

Reading Gas Company,
March 12, 1938.

Obituary

The death occurred on March 6, after a long illness, of Mr. S. DICKIE, who retired last month through ill-health from the Managership of Dumfries Corporation Gas-Works. A native of Maxwelltown, Dumfries, Mr. Dickie entered the local Gas Department at the age of 15, and was 45 years in its service. In 1909, when he was Chief Clerk, he was appointed with Mr. John Smith as Joint Manager, in succession to the late Mr. George Malam, and when Mr. Smith went as Manager to Stirling he was left in sole control. He leaves a widow and two sons.

Personal

Mr. ALAN MIDDLETON, of the Hartlepool Gas and Water Company, has been appointed Secretary to the City of Durham Gas Company, in succession to Mr. THOMAS W. WALLER, who is retiring after 39 years' service. Mr. Middleton is the son of Councillor J. Middleton, of West Hartlepool.

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A deputation representing prominent Southampton Companies with which Sir RUSSELL BENCRAFT, J.P. (Chairman of the Southampton Gaslight and Coke Company), has been associated for many years met on March 4 to ask his acceptance—by way of marking his 80th birthday—of a cheque to be devoted to charities and of an illuminated album containing the signatures of the 1,362 contributors. The presentation was made by Mr. W. A. Gleave, J.P. (Director and General Manager of Southern Newspapers, Ltd.), who was supported by Brigadier E. M. Jack, C.B., C.M.G., D.S.O. (Deputy-Chairman of the Southampton Gaslight and Coke Company). Sir Russell Bencraft allocated the cheque as follows: Royal South Hants and Southampton Hospital, £44; Southampton Children's Hospital, £20; Southampton Free Eye Hospital, £20; Hampshire Girls' Orphanage, £10; Southampton Seamen's Orphanage, £10; Southampton Council for Social Service, £10; Southampton Refuge, £10.

Forthcoming Engagements

March

17.—I.G.E.—Refractory Materials Joint Committee, 2.30 p.m.
17.—Southern Association (Western District).—Commercial Meeting, Rougement Hotel, Exeter, 2.30 p.m.
18.—Manchester Association.—Annual Meeting, Midland Hotel, Manchester. Presidential Address of E. Astbury.
19.—Wales and Mon. Juniors.—Visit to Neath.
21.—L.C.C.A.—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
23.—London and Southern Juniors.—Visit to G. A. Harvey & Co., Greenwich Metal Works.
24.—Midland Association.—Annual General Meeting, Grand Hotel, Birmingham.
25.—Southern Association.—Annual General Meeting, Hotel Victoria, W.C. 2, 2.30 p.m.
26.—Western Juniors.—Visit to Bridgwater. Question Box.
26.—Yorkshire Juniors.—Meeting at Bradford. Paper by A. Pickard on "The Technical Control of a Small Undertaking."
26.—Scottish Western Juniors.—Annual Busineess Meeting at Glasgow Corporation Lighting Department. Paper by W. Rae, of Electrolux, Ltd., on "Domestic Refrigeration."
29.—B.C.G.A.—Eastern District Conference at Cambridge.
29.—Gas Coke Export Association.—Committee Meeting, 11 a.m.; Annual General Meeting, 12.15 p.m., at Gas Industry House.
29.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m.
31.—S.B.G.I.—Council Meeting, 2.30 p.m.

April

1.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
2.—Scottish Eastern Juniors.—Visit to Aitken Colliery. Paper by G. Jenkins on "Coal Analysis."
7.—I.G.E.—Joint Committee on Complete Gasification under Pressure, Fuel Research Station, S.E. 10, 11 a.m.
7.—Midland Juniors.—Meeting and Paper by W. L. Howe, of Nottingham, on "Gas and Filtration and Heating of Swimming Pools."
8.—North British Association.—Spring Meeting at Coatbridge.
9.—Manchester and District Juniors.—Annual Dinner. Paper by W. Hodkinson on "Technical Work in a Holding Company."

New Company Registered

The Jones Gas Process Company has been registered as a private Company, with a capital of £6,000. The Directors are Messrs. A. P. Good (Chairman of Heenan & Froude), W. M. Ratcliffe (Managing Director of Heenan & Froude), S. G. Wood (Director of the Severn Valley Gas Corporation), G. M. Gill (Director of the Severn Valley Gas Corporation), and L. B. Jones (Director of Jones Gas Process Corporation, of California). The Company's process is for the production of gas from fuel oil, and the first plant to be erected for this process in this country will be for the Severn Valley Gas Corporation at Newport (Mon.), where it will be a standby plant. Much of the plant will be produced by Heenan & Froude, engineers.

News of the Week

The Sileby Gas Company, Leicestershire, are to include Seagrave and Cossington in their area of supply.

The Price of Gas supplied by the Plymouth Gas Department will remain at its present figure for the next twelve months.

To Meet the Cost of Hire-Purchase Appliances, the Dumfries Gas Department is to make application to borrow the sum of £6,000.

To Erect a Vertical Retort Installation at their gas-works the Lymm Gas Department have applied for sanction to borrow the sum of £11,000.

Application for Sanction to borrow £15,000 for expenditure on street lighting by gas during the next three years is being made by the St. Helens Gas Department.

Application for a Special Order, under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Lymm Urban District Council.

On the Occasion of the Jubilee of the Incorporation of the Borough, the Loughborough Gas-Works and power station will be open to inspection by the public on March 16 and 19.

An Enquiry was held at Coalville on March 1 into the application of the Coalville Urban Council for sanction to a loan of £15,060 for the extension of the gas-works and the erection of a new holder. A site had been purchased from the Whitwick Colliery Company. There was no opposition.

For the Appointment of Gas Engineer, the Town Council of Aberdeen are prepared to receive applications. The successful applicant will require to act as Assistant to the present Engineer until he retires on March 31, 1939. Further particulars of the position will be found in our advertisement columns.

Gas Refrigerators and Water Heaters were the main features of a particularly attractive stand of the Manchester Corporation Gas Department, in the Brighter Homes Exhibition in the City Hall, Deansgate, Manchester. Demonstrations were also given of the latest designs in self-lighting gas fires and thermostatically controlled cookers.

A Lecture on "Water Heating by Gas" was delivered at the chief showrooms of the Sheffield Gas Company on March 11 by Mr. Lomax, of the Technical Staff of Maxol Heaters, Ltd., Manchester, in the presence of a large gathering of the Sales and Distribution employees of the Company. A series of lantern slides were shown during the evening and a good discussion followed the lecture.

There is Offered for Sale by Tender by the Watford and St. Albans Gas Company £200,000 of 4% redeemable preference stock at a minimum price of issue of par, at which price the yield is 4%. This stock is to be repaid at par on July 1, 1978, or at the Company's option at par on July 1, 1973, or at any time between then and the final redemption date, on giving three months' notice. Tenders must be received by 12 noon on March 28.

Speaking to an Audience of Housewives at the Luton Gas Company's Demonstration Hall to-day, Mrs. Eileen Murphy said that while she agreed with the saying that the two most useful books in a girl's life were father's cheque book and mother's cookery book, she would go further and say that the cookery book was no good unless you had the right kind of cooker. "Eight million English women," said Mrs. Murphy, "are using gas cookers because they are clean to use and cheap to use, and because the heat is easy to control."

Work Has Commenced on the erection of the Croydon Gas Company's new showroom in Brighton Road, Coulsdon. The building will comprise the showroom, with demonstration room above, two lock-up shops, and residential quarters. The plans have been prepared by Mr. W. F. Blagg, of the Nautilus Building and Decoration Department of the Davis Gas Stove Company, who will do the constructional work. The building will be of red brick and stone and the showroom front of stainless steel. It is hoped that the showroom will be opened in the autumn.

A Gas Street Lighting Installation is to be proceeded with by the Middlesbrough Corporation Gas Department in the portion of the Redcar Trunk Road which lies within the Borough—a distance of 1¾ miles. The road is an important one carrying a large amount of fast traffic. The lighting will conform to Group A classification.

The Annual Meeting of the Manchester District Association of Gas Engineers and Managers will be held at the Midland Hotel, Manchester, on Friday, March 18, preceded by the annual luncheon. Following the usual business of the meeting, Mr. F. Astbury, Chief Engineer of the Liverpool Gas Company, will deliver his Presidential Address.

Bed-Bugs affect four million people in about one-third of the property in London; these startling figures are revealed by a worker at the British Natural History Museum. To combat this menace a new bug-killer has recently been discovered which is perfectly harmless. It is called "High Flash Naphtha," and most of London's supplies come from the Gas Light and Coke Company's by-products works at Beckton. It is sprayed in a sealed room which has been heated up beforehand, and the disinfectation process takes only a day and means that householders need stay away from home for one night only.

For Sale by Tender, the Directors of the East Surrey Gas Company are offering £37,500 4½% redeemable preference stock at a minimum price of issue of £105 per £100 stock. The stock is redeemable at par on July 1, 1978. A deposit of £10 per £100 (nominal) must accompany a tender, and the balance of the purchase money is to be paid on or before April 30, 1938. Purchasers will, on Sept. 1 next, receive three months' dividend in respect of the period ended June 30, 1938; thereafter dividends will be paid half-yearly on March 1 and Sept. 1. An abridged copy of the prospectus will be found in our advertisement columns.

The Growth of the Leyland Gas Company was described by the Chairman of the Urban District Council, Mr. A. Parkinson, opening a "Home and Health" Exhibition at Leyland Public Hall on Wednesday of last week. The Chairman of the Company, Mr. A. Ogden, pointed out the way in which gas was an asset to the kitchen. The purpose of the exhibition was to demonstrate this and other uses of gas. Mr. F. Elliott, Manager of the Leyland Gas Company, seconded the vote of thanks to the opener. The exhibition, which comprises health talks, washing, cookery demonstrations, as well as demonstrations of modern gas appliances continued until Tuesday last.

Some 350 Children were entertained at the annual party held by Croydon Gas Company employees. The youngsters did full justice to the tea provided for them and listened attentively when Mr. W. J. Sandeman (General Manager) addressed a few words to them. He emphasized the amount of work entailed in organizing the party and led three cheers for those responsible. Following community singing, an enjoyable concert was presented. A feature of the programme was a sketch written and produced by Mr. H. J. May, entitled "The Cruise of s.s. *Waddon,*" which was acted by members of the committee. This, and a cinematograph show presented by Mr. M. O. Coates, proved very popular. Before leaving, each child received a box of chocolates.

A Series of Gas Cookery Demonstrations was given in the Hereford Gas Department's demonstration room recently by Miss Barbara Cobb (Parkinson Stove Company), who used a "Renown" cooker. Mr. G. H. Davies (District Superintendent), in expressing the thanks of the Department to the demonstrator and to the ladies who had attended the series, apologized for the unavoidable absence of the Chairman of the Gas Committee, Mr. F. Cuddon. Mr. Davies then asked Mrs. Roberts to present the prizes to the successful entrants of the cake competition. Mr. A. R. W. Roberts (Engineer and General Manager) expressed his personal appreciation of the services of Miss Cobb, also of Mr. Holgate, of the Parkinson Stove Company, who, together with the staff of the Gas Department, had contributed so much to the success of the demonstrations.

National Gas Council

Meeting of Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, Grosvenor Place, S.W. 1, on Tuesday, March 8, at 2.30 p.m. The President, Sir DAVID MILNE-WATSON, Bart., LL.D., D.L., took the chair.

Resignation of Mr. Frank Prentice.—It was reported that Mr. Frank Prentice had been a member of the Council since 1919; he was appointed Chairman of the Eastern District Executive Board in April, 1930, and had been a member of the Central Executive Board since 1929. It was agreed that a letter should be sent on behalf of the Board, expressing great regret at his resignation, thanking him for his many years loyal co-operation, and expressing sincere wishes for his restoration to health.

Coal Bill.—It was reported that the Prime Minister was now considering this problem and that there would be a full debate on the subject on the Report Stage.

It was also reported that a communication had been received from the Central Coal Council with regard to the regulations governing the duration of contracts for supplies of coal at the present time. It was pointed out that the duration for which contracts may be made was governed by the custom prevailing in the district concerned and that the custom was not uniform in any individual district. The only part which the Central Council took in the regulation of the duration of contracts was that it fixed the farthest date up to which delivery may be provided under any contract, and at present this date was June 30, 1939.

Hire-Purchase Bill.—It was reported that the amendment exempting Public Utilities from the operation of the Bill had been lost. The Report Stage of the Bill was not expected before Easter, and the Conjoint Conference of Public Utility Associations would consider the extremely drastic amendments which had been made in the Bill in Committee.

It was stated that one of the most difficult problems in this connexion would undoubtedly be the question of the cost of fixing. As the Bill now stood, it would be impossible to recover possession of any apparatus or appliance after one-third of the instalments had been paid, without an application to the County Court. This would obviously be inequitable in the case of a Public Utility Undertaking, since one-third of the hire-purchase price would, in many cases, be insufficient to cover the cost of fixing alone.

Street Playgrounds Bill.—The object of this Bill was to enable certain Local Authorities to make an Order, closing specified roads within their area in order that they might be used as playgrounds for the children. The Bill did not contain any special provisions relating to Public Utilities. An assurance, however, had been received from the Ministry of Transport that the position of Public Utilities would be protected in the Orders made under the Bill.

Rating—Postponement of Third Quinquennial.—It was reported that the Minister of Health, in answer to a question in the House of Commons on Feb. 17, had stated that in view of certain representations made by the Central Valuation Committee, he proposed at an early date to introduce legislation to postpone for a period of two years the making of the new Valuation Lists in connexion with the third quinquennial valuation. This would have the effect of delaying the commencement of the third quinquennial period from April, 1939, until April, 1941.

Conjoint Conference of Public Utility Associations.

(*a*) *Land Drainage—Meeting with Association of Land Drainage Authorities, March* 3, 1938.—It was stated that a report of this meeting had been circulated to the Board, and that it was hoped that some amicable settlement would be reached, pending the introduction of the new legislation which had been foreshadowed by the Ministry of Agriculture.

(*b*) *Mains and Cables in Highways.*—Written reports had been circulated regarding the meetings of the Conjoint Conference. Regret was expressed that the negotiations with the Highway Authorities had proved abortive. The Board discussed the steps which should now be taken to raise this matter with a higher authority.

National Smoke Abatement Society—Conference of London Local Authorities with regard to the establishment of a Greater London Smoke Abatement Committee, held at the County Hall on Feb. 25, 1938.—It was stated that the London County Council had been considering the steps that should be taken to diminish the pollution of the atmosphere due to the burning of raw coal. The question had been raised by the Standing Conference of Co-operating Bodies, which consisted of representatives of the Government Departments, including the Department of Scientific and Industrial Research, the L.C.C., Local Authorities, the British Commercial Gas Association, and the British Electrical Development Association.

The Conference called by the National Smoke Abatement Society on Feb. 25 was presided over by Lord Snell, Chairman of the London County Council, and consisted of representatives of the County and Local Authorities of Greater London.

The business of the meeting had been to consider what administrative steps could be taken to promote smoke abatement. Sir David Milne-Watson had put forward two suggestions for dealing with this problem—viz.:

(1) That Local Authorities should offer a rebate of 3d. in the pound to ratepayers who agreed to restrict their houses to the use of smokeless fuel; and
(2) That a "Smokeless Zone" should be declared in London's central areas.

A resolution had been passed recommending the formation of an Advisory Regional Smoke Abatement Committee for London and Greater London, and requesting the National Smoke Abatement Society to report to the Authorities concerned, asking them to agree in principle to the proposal, and to be represented at a further meeting to be convened for the purpose of establishing such a Committee.

Empire Exhibition, Glasgow, 1938.—Particulars were given of the Gas Exhibit which would be shown at the Empire Exhibition in Glasgow. It was stated that an organized visit of representatives of the British Gas Federation was under consideration, and that the date proposed for such visit was Wednesday, June 22, 1938.

Date of next Meeting.—It was agreed that the next meeting of the Board should take place on Tuesday morning, May 10, the date of the Annual Meeting of the Council.

Demonstrations at Bury St. Edmunds

Cookery Demonstrations were held by the Parkinson Stove Company in conjunction with the Bury St. Edmunds Gas Company, in co-operation with Messrs. Colmans, Norwich, when the Parkinson "Renown" Gas Cooker was used. These demonstrations were supported by local Press advertising, resulting in large audiences and sales and enquiries gratifying to all parties interested.

"Waterless" Cookery

A booklet published by the Parkinson Stove Company, Ltd., describes work undertaken by the staff of the Company's Research Kitchen into "waterless" cookery and claims many advantages for this method of cooking vegetables. No special equipment is needed. Any pan with a well fitting lid will suffice. It is stated that the ordinary way in which vegetables are cooked results in unnecessary loss of valuable mineral salts and vitamins, which, washed out by the water, are poured down the drain. Preservation of food values is the major advantage claimed, but others are set out in the Parkinson booklet. Food cooked the "waterless" way retains its fresh appearance, is firm and of good shape, and appeals to the palate. Again, the decreased time for cooking, compared with the boiling method, added to the small amount of gas needed, means a definite saving of fuel. The process is certainly entirely straightforward. The vegetables are prepared and placed in a saucepan, salt is added, and then sufficient boiling water is poured over the vegetables to cover the base of the pan. The gas is turned on full till steam appears and then turned down to simmering position. The lid is not removed during cooking. The booklet includes a "vegetable chart" giving the approximate cooking time, and there is a series of recipes. It is pointed out that a vegetable meal may be prepared with any combination of vegetables listed on the chart which require the same length of time for cooking. There will, it is stated, be no interchange of flavours if strong and mild flavoured vegetables are cooked together in a large covered pan with steam vent, provided the lid is removed at the end of cooking before the gas is turned off.

Doncaster's New Service Centre

In 1936 the Doncaster Corporation Gas Committee acquired premises in Silver Street for showroom purposes. For some months these premises were subsequently occupied by the staff of the Borough Treasurer's Department while their own offices were being rebuilt, but the conversion of the buildings for the purpose for which they were bought has now been completed, and, as was mentioned briefly in the "JOURNAL" for March 2, the Showrooms were opened on Thursday, Feb. 17, by Alderman W. J. Crookes, the Chairman of the Gas Committee.

As there is a frontage of only 31 ft. to the street, increased window display was obtained by forming an arcade some 50 ft. long leading to the main showroom at the back of the premises. Thus window space of about 120 lineal ft. was secured, and this is lighted by means of Sugg's 6-mantle strip lamps, distance controlled, placed above the level of the window panes and invisible to those outside. The entrance is heated by two radiant heater units of the 14 in. by 4 in. rectangular type, air for which, under a pressure of 3 in. water head, is provided by a fan in the cellar.

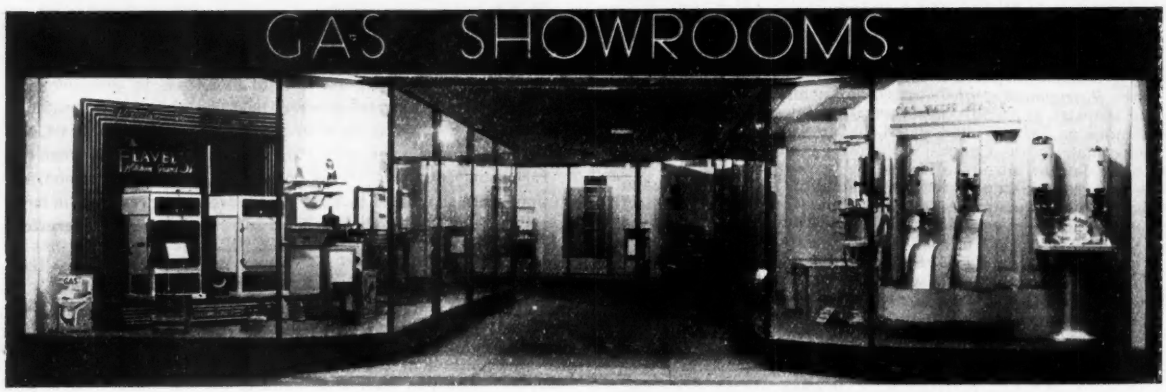
The main showroom is 64 ft. long by 38 ft. wide, and is lighted naturally by a window at one end of the room and by roof lights. Artificial illumination is by means of 10 Sugg's "Salon" 6-mantle lamps fitted with distance control. One side of the showroom is divided into cubicles laid out to show gas appliances in such rooms as kitchen, bathroom, and lounge, while as a centre piece to the series of rooms a dummy hot closet with stainless steel trough supports a panelled layout of water heating appliances.

The reconstruction of the premises necessitated a staircase from the main showroom to the demonstration room upstairs. This has the advantage of ensuring that everybody attending cookery lectures, &c., is compelled to pass through the arcade and the main showroom on the way to the lectures.

The demonstration room is 48 ft. by 28 ft., and will accommodate an audience of 150. A platform 28 ft. long by 10 ft. wide is fitted with stainless steel sink with instantaneous water heater, two cookers connected to a large-dial meter to record the gas consumption, enamelled-topped table, and refrigerator, for demonstration work. The chairs are of the Pel tubular nesting type, and artificial lighting is by means of Sugg's 6-mantle "Tintern" ventilating lanterns in the ceiling with distance control, and cylindrical globed single burner brackets on the walls, with "Webson" switches operated from near the door.

The premises are heated by means of a K.26 "Ideal" boiler originally coke-fired, but now converted by means of a set of "Duoflam" burners to a gas-fired unit.

An illuminated facia, with the words "Gas Showroom" over the entrance, was the first of its type to be made, while "Mr. Therm," also illuminated at night, reminds passers-by of the sign now instinctively associated with the Gas Industry. Another facia of black vitreolite with "Gas Showrooms" in orange colour is placed some 20 ft. high on the front of the building, and shows up well under the light of a 4-mantle "Magnalux" low-pressure lamp of the kind first introduced by Mr. George Keith at the Folkestone Conference of the Association of Public Lighting Engineers.



Amalgamation and Grouping

Stellite Offer to Llandudno Withdrawn.

Stellite, Ltd., of Queensferry, have withdrawn their offer to purchase the undertaking of the Llandudno Gas Department. In doing so, the Stellite Company state that at the time of the offer in April, 1937, conditions were not as they are to-day, substantial advances having been made in the price of coal, wages, and materials generally. Had the offer been accepted in a reasonable time, the Company say they would have been able to arrange matters at Llandudno in conjunction with Conway; but as twelve months have passed it will now be necessary to investigate the latest accounts. It is suggested that in due course the Council may be approached again after they have had the opportunity of further working under present-day conditions.

Ramsbottom and Cloughfold.

As a result of the taking over a few months ago of the Rossendale Gas Company's undertaking at Cloughfold, Lancashire, by the United Kingdom Gas Corporation, the Ramsbottom Gas Company and the Cloughfold Company are to be amalgamated. Gas will no longer be made at Stubbins; it will be manufactured at the Cloughfold plant and conveyed at high pressure to the Stubbins station, which will be used as a distributing centre. It is understood that very few workers with the Ramsbottom Company will be affected by the changes, which will not be completed until towards the end of the year.

North Shore and Manly.

The amalgamation of the North Shore Gas Company, Ltd., and the Manly Gas Company, Ltd., of New South Wales, Australia, has now been completed. Mr. S. J. Janes and Mr. Edgar Foster, formerly General Manager and Chief Engineer respectively to the North Shore Gas Company, have been appointed these same positions in the amalgamated Company. Mr. A. H. Smedley and A. J. Ambrose, formerly General Manager and Chief Engineer respectively to the Manly Gas Company, have been appointed Assistant General Manager and Assistant Chief Engineer respectively to the amalgamated Company.

A.R.P. and the Gas Industry . . . .

This important matter was the subject of a Paper by Mr. J. Mitchell (Engineer and Manager of the Leicester Gas Department) to the Midland Commercial Gas Association on March 10.

It will be recalled that we published in the "JOURNAL" for Feb. 2 an account of the air raid precautions undertaken by the Leicester Gas Department and of the experimental "black-out" in that city on the night of Jan. 27-28.

After referring to the various methods adopted at Leicester, as outlined in that article, Mr. Mitchell observed that with these, or similar elementary precautions, it would appear to be possible to "black-out" gas-works satisfactorily. In these circumstances and considering the simplicity and cheapness of the method, "black-outs" are the most practical solution for night time air raids.

The more difficult question to answer is what precautions are to be taken against daylight raids. Gas-works as generally visualized—gasholders and their surroundings—are very prominent in any landscape, and there is little doubt in my mind that in daylight or on moonlight nights they are easily discernible from the air at very great heights.

The only solution to this problem is, I believe, camouflage. My suggestion, which is put forward to you on behalf of Wing-Commander Hodsoll, Inspector-General of Air Raid Precautions, is that all gasholders should be painted grey, and that each undertaking should keep in stock sufficient paint to carry out a camouflage design on this grey background as soon as occasion arises. That completes what might be called the first phase of Air Raid Precautions—the creation of a protective screen—the "black-out" for night time, camouflage for daylight.

Now for the second phase of Air Raid Precautions. What precautions can be taken against damage which may be done to gas-works by aerial bombardment. This matter has already been dealt with in some detail in the Air Raid Precautions Memorandum No. C1 entitled "Air Raid Precautions for Gas Undertakings," which is issued by H.M. Stationery Office, price 6d. net.

This communication, among other things, sets out the emergency kit required, the duplicate plant to be supplied, and the advisability of providing distance controls, but I believe the general impression regarding this is that the scheme as set out is much too costly to be practicable. One thing appears certain, that it is impossible to provide against a direct hit by a large bomb; the only resource in this case is to have a spare gas-works handy to put into immediate commission.

Still there are certain precautions that can be carried out, and if I may make a few suggestions I have no doubt that many of you will have others to put forward during the discussion which is to follow.

First of all, I think it behoves us all, in view of the havoc which can be caused by the modern high-explosive bomb, to see that all valves on the gas-works are in working condition and gas-tight, so that in emergency different sections of the plant can be isolated.

Secondly, where possible some protection—such as sand-bag partitions—should be erected to screen, or cover vital places or equipment, such as boilers, steam line, exhausters, &c.

Thirdly, protection should be arranged for personnel on the works, and training in the elementary principles of air raid precautions should be given, not only as regards decontamination, &c., as is taught at the Civilian Anti-Gas Schools, but regarding the precautions to be taken on the gas-works itself, the position of specially important valves, apparatus, and duplicate equipment.

Fourthly, prepare a plan, and where possible provide for duplicate plant to be used, should some vital part of the works be crippled and the gas supply not only interrupted, but the existence of the whole works jeopardized. For instance, imagine the position of the works if the steam supply were struck and the exhausters stopped. And so on and so on—one can let one's imagination run ahead.

So much for the protection of a gas-works; but what about safeguarding the public from the danger of escapes and possible explosions of gas following the fracture of gas mains in the highways?

In dealing with this third phase of air raid precautions we have to concern ourselves not only with damage to our own property and personnel, but more especially with the well-being of the public at large. It is well known to us all that a few high explosive bombs could completely sever the whole town's gas supply without actually hitting the Works themselves. The supply would not, of course, be permanently dislocated, but delay in resuming gas service may give rise to panic conditions, and I believe that if the ordinary services can be maintained in such times they will do much to restore confidence and stop any widespread panic.

Dividing Up the District.

For these reasons Leicester has prepared a draft scheme whereby the area of gas supply has been divided into districts, each of which could be isolated from the others, and the gas entirely cut off.

In the past it has been the practice in Leicester to link up mains wherever possible to ensure adequate pressures on the district. This, of course, tends to increase the difficulty of isolating sections of gas mains. To reduce the number of valves necessary to form the boundaries between the districts it is proposed to cut and cap up certain mains which at the present time form subsidiary link-ups between these selected districts.

Only in the event of very extensive damage to the distributory system would it be necessary to isolate districts completely—slight damage to mains could be repaired by the normal procedure—but I feel it is the panic caused by the widespread upheavals that must be guarded against, and if the undamaged sections can continue to be served, any system giving such an advantage should be provided. For example, it is not often that the largest sizes of mains are kept in stock—we do not stock 36-in. at Leicester—but difficulties with our 36-in. feeder main could be tided over by keeping in stock specials, such as 36-in. to 18-in. reducers.

Continuing along the line of frightfulness, it must be remembered that repairs to mains and fractures may be handicapped by the presence of poison gases—and here is a nasty problem. The general service respirators now being issued are quite satisfactory to combat the poison gases likely to be used in war, but quite unsatisfactory against coal gas. Men attending at the site of a gas main fracture and wearing respirators as a protection against possible poison gas would be subject to carbon monoxide poisoning from escaping coal gas, and furthermore, they would be unable to detect the presence of such coal gas, because the activated carbon in the container of the respirator would effectively deodorize the familiar coal gas smell.

Before concluding this, to me, rather a distressing subject, there are two further points I would like to bring to your notice. First, the training of our personnel, and what is closely connected with it, establishing liaison with the Local Authorities who are dealing in their specific districts with air raid precautions. No doubt most of you will have made some move in these directions. In Leicester we have prepared a scheme in co-operation with the Air Raid Precautions Co-ordination Officer to the City. Further, we have appointed an Air Raid Precautions Officer for the Gas Department, who has recently secured a first-class certificate from the Civilian Anti-Gas School. We are now proceeding to the full training of volunteers, having first instructed all employees in the general principles of air raid precautions. In co-operation with the City Authorities we are proposing to

erect within the shell of one of our old retort houses a decontamination station, suitable for 70 to 100 men.

I have left to the end the matter of finance, because I feel sure it will be uppermost in your minds. Who is going to pay for all this? Well, frankly, I cannot tell you, but I feel that if the Government are prepared to spend huge sums on air raid precautions, and fire fighting, and other equipment is to be provided by Exchequer grants, gas with its own peculiar dangers should be similarly classed. The Air Raid Precautions Act, 1937, states that it is the duty of Local Authorities to prepare and submit air raid precaution schemes to the Secretary of State, and no doubt gas undertakings in their turn will be expected to take their part in protective measures.

The Government at the moment have a scheme under consideration to supply fire fighting appliances to undertakings with extraordinary risks of fire in air raids. Leicester is asking its Gas Department to arrange for volunteers to be trained as an auxiliary fire fighting force—the Department has a private fire brigade already—and it is highly probable that the Undertaking will be able to call upon some of the additional fire fighting appliances available.

Gas has its own peculiar dangers in connexion with aerial bombardments, and while it is far from me to exaggerate those dangers, it does, I feel, behove us all to face this problem now, so that we may be in a position, should the time ever come, at least to be prepared.

Local Authorities are considering these problems most seriously, and unless we take our part in the preparation of schemes now, false and conflicting rumours of the risks from gas-works and from the gas services as a whole may begin to circulate, much to the detriment of the Gas Industry.

Discussion.

In the course of a discussion which followed, the CHAIRMAN (Mr. A. Mackay, of Stoke-on-Trent) said the Association was very grateful to Mr. Mitchell for a Paper on this very vital subject. For some considerable time past they had been active in this direction at Stoke-on-Trent. For some time he had been experimenting in regard to reduction of pressure in the city so far as street lighting was concerned. Such a reduction could be used as an indication to the public that an air raid might be expected. He had tested a number of controls and had selected one which appeared to be quite satisfactory, although the varying heights of the city rendered a pressure which was suitable at one point quite unsuitable at another. The question of cost was an important one; he had something like 6,000 lamps throughout the city, and he estimated that such controls would cost about £1 per lamp. However, the Government had recently announced that street lighting would be discontinued in the event of war. Only certain leading lamps would be maintained in main thoroughfares, so the cost in this respect would be considerably reduced. The question of camouflaging the gas-works was an important one, and the Government had taken up the question of painting gasholders and had sent him a sample plate, which was of dark battle grey without glitter. He was trying to obtain supplies of the paint, but there was some difficulty in getting it.

He had already had his men trained, taking some from each department, and had put his deputy in charge of this training. Other men had been put in charge of fire-fighting. He strongly recommended everyone to give the same training to all—not only on the works but also on the district, particularly the latter. In Stoke the Health Department had taken charge of decontamination work. It was essential for staffs to be properly trained to meet any emergency. The provision of an air-raid shelter to accommodate 60 to 80 men would cost about £2,000.

Mr. MITCHELL said he had received a letter from the Home Office that morning recommending a particular shade of grey for painting gasholders.

Mr. H. DAVIES (Chesterfield) said that air raid precautions in Chesterfield had to be carried out under the County Council, who were very slow in moving. They could take precautions so far as their own works were concerned but were not empowered to carry out any scheme which involved the whole town. In the course of extensions to mains they had, however, taken the opportunity of putting in valves on various districts, whereby the area of supply could be divided into four separate sections, any of which could be isolated. They had also trained their men to some extent but not to the extent of Leicester or Stoke. They would have liked to have some assistance in this training but were unable to obtain it.

Mr. W. G. S. CRANMER (Willenhall), referring to the maintenance of stocks, observed that it was difficult to keep sufficient quantities to meet any emergency. He suggested that it might be possible in a district like South Staffordshire, where a number of gas undertakings were adjacent to one another, to arrange a central depôt for such purposes, suitable sizes of main for each undertaking being stored. As regards neighbouring undertakings making provision for coupling up their mains, this was by no means easy by reason of the differing sizes of pipes employed. As to street lighting, all lamps which could be reached with ladders could be easily dealt with, but many newer installations with greater mounting heights presented a pressing problem. They were told that in the event of war all street lamps would be immediately cut off except for certain essential lamps, and those could be dealt with in a comparatively short time. There had been an account of a recent black-out at Lichfield where all the street lamps were put out by pressing a button.

Mr. G. DIXON (Nottingham) observed that so long as they had no decision in regard to cost it was difficult to make any definite statements on this subject. The Government had made up their mind that there should be no street lighting in times of war, while certain properly designed headlamp shields would be provided for motor-cars, together with direction beacons in the streets. The training of personnel was being carried out through municipal schemes, and there were plenty of keen men ready to undergo training in decontamination. Individually they could do any of a thousand things, but there was no guarantee at present that it would be the right thing in an air raid. With the aid of sandbags and shelters a good deal could be done, but quite apart from that the mere talking about the precautions that were being taken would do a great deal of good psychologically.

Mr. R. S. RAMSDEN (Leamington) observed that if, in the event of a bombardment, all lamps had to be put out quickly, it would be valuable to have some method available to do this. He suggested the provision of special taps for public lamps and responsible persons in charge of extinguishing them over stipulated districts.

Mr. A. W. SMITH (Birmingham) said that the anti-aircraft sections would be mobilized very quickly and they could take charge of such situations.

Mr. H. WYNNE (Burton-on-Trent) said that he had a system of pressure extinguishing for lamps, which had been inspected by members of the Council of The Institution of Gas Engineers. They found that 1,300 lamps could be extinguished in three minutes and the number of failures never exceeded 1%. The method they employed was to throw out the station governor and put on a sudden pressure wave. It was in their case a very simple matter.

The CHAIRMAN, in closing the discussion, said that the most important point was to emphasize to the public what the Gas Industry was doing to safeguard their interests.

Gas Undertakings' Results

Guildford.

That the business continues to be satisfactory is reported by the Directors of the Guildford Gas Light and Coke Company, in submitting to the proprietors the accounts for the year 1937. The dividends recommended make for the year 8½% both on the consolidated ordinary stock and on the electricity ordinary stock. There will be left a balance of £17,052 to be carried forward. The quantity of gas sold was 414,864,000 cu.ft., or 1,866,888 therms; and of electricity, 908,237 units, the bulk supply purchased having totalled 1,068,810 units. The undertaking of the Cranleigh Gas and Electricity Company was acquired in 1931. There are balances at debit of Capital Accounts amounting to £42,808 in the case of gas, and £34,121 for electricity; while on the other side of the balance-sheet is shown bank overdraft £14,161, and temporary loan £30,000. On Dec. 31, 1937, £6,400 of 5% mortgage debentures were redeemed at par. In each case the amount carried forward is a trifle larger than that brought into account.

Wells (Somerset).

The Directors' report and accounts of the Wells Gas Light Company cover the nine months ended Dec. 31 last, during which period important changes have been made in connexion with the undertaking. In October, the majority of the stockholders exchanged their stock for the equivalent value in shares of the South-Western Gas and Water Corporation, Ltd., and the Company was merged with that Corporation—the position of the Company, the Directors say, thus becoming materially stronger. The quantity of gas sold during the nine months—31,624,800 cu.ft.—shows an increase on the previous similar period. The dividend is at the rate of 5% per annum on the ordinary stock. Mr. G. F. Dunn, for nearly twenty years Secretary and Manager to the Company, has retired, and was compensated for loss of office. Mr. Clarence Dunn, who for seven years had acted as Assistant, was appointed by the Directors to fill the vacancy.

The Future Orientation OF THE Gas Industry

In the "JOURNAL" for Jan. 5 last the Author suggested that the cost of gas to the consumer could be lowered by the supply of low-grade gas. His statements, as was to be expected, were criticized, and this article is a reply and embodies further thoughts on the subject.

By "M.Inst.Gas E."

The article which was contributed by the writer to the issue of the "GAS JOURNAL" on Jan. 5 has provoked a great deal of interest. This degree of interest has not unfortunately been reflected in the correspondence columns of the paper, but it has been very real, as has been witnessed by many illuminating comments and conversations in the presence of the writer by those who knew not that they were addressing the Author. These comments, however, were nearly always favourable, and such objections as have been raised have been adequately covered by comments that have appeared in the "GAS JOURNAL." It will be sufficient, therefore, to deal here with the published objections contained in the letter signed "Doctor of Philosophy" in the issue of Jan. 12 (p. 108) and in Editorial Comments on Jan. 19 (p. 174).

To avoid misconception, it will be well to give a brief summary of the ideas underlying this enquiry and what has emerged from it. Some twelve months ago the writer, who has had experience of many types of carbonizing plant—high and low temperature—including mechanical gas producers, and who was not connected with any company producing gas or producing gas-making equipment, came to realize that instead of our present arduous and somewhat pedestrian methods of climbing up the ladder of increased output, another policy might be applied. It was seen that the changing habits of our people, together with the increasing standard of living, are causing the trouble and dirt associated with the coal fire to become unpopular, especially in the South of England. It cannot be doubted that this movement will spread. People will demand fuel "on tap" for most purposes, and they will require smokeless fuels for all purposes. These requirements can only be met by gas and electricity, coupled with coke for certain purposes such as domestic hot water or burnt with gas in the living room fire for those who still prefer the appearance of a solid fuel fire to the convenience of a gas fire. It was recognized quite early in the enquiry that some 80% of the population have an income under £5 a week, and 60% under £3 a week. If these people are to have the benefits of greatly extended use of gas, even to the extent of the "all-gas" house, the price at which they are supplied with gas must be such that their weekly fuel bill will cost them no more than at present. Obviously, it is no use offering gas at figures of the order of 8d. to 1s. a therm, and the calculation was made in the initial article that in districts and in times wherein the price of house coal is 50s. a ton, the gas price must be approximately 6d. a therm. As a round figure where (as is often true) the price of house coal to the consumer is 40s. a ton, the price of gas must not exceed a round figure of 5d. a therm. These figures will be further modified in the upward direction whenever coke is combined with gas, and unquestionably in the earlier stages of the all-gas house movement much advantage will be gained from using coke, and in making our initial ideal the "all-gas products" house. That, however, is by the way. The great point is that the way to sell gas is to make it cheap; and the way to make it cheap is to keep the engineer at work *as an engineer* and not as a technical salesman—a modern movement that is to be deprecated. The first point, therefore, is (1) to enquire authoritatively and in all districts, and having regard to the best appliances available, at what price gas must be supplied to displace coal entirely, and (2) to decide how the price of gas can be reduced to this limit, or below it.

The writer's conclusions having led him to decide that a reduction in the price of gas is necessary, and that this means a reduction in the manufacturing cost of gas, set out to discover in the light of his comprehensive knowledge of coal carbonization and gasification how this could be obtained. The conclusion reached, as set forth in the initial article, was that there does not at present seem any way of making high C.V. gas that can compete in cost per therm with possible ways of making low C.V. gas.

This brings us by natural stages to the first objection raised against the idea of making low C.V. gas ("low" being defined 200 to 300 B.Th.U.), namely, that the statement was made but not proved that the cost of making 200 B.Th.U. would be of the order of 1d. per therm. The omission to prove the statement was deliberate. First, production of low C.V. town gas from coal is in its infancy, and even if figures were available from existing plant, it is highly improbable that they would represent practice on an extended scale. The history of the vertical retort shows clearly what enormous advances can be made within a few years when great contracting firms apply their minds to the problem. Second, an outline of the process only was intended to be given, and it was anticipated that gas engineers would be able readily to calculate for themselves that, with so simple a plant, the figure given must be sufficiently accurate as a basis. Neither "Doctor of Philosophy" nor our worthy Editor agreed with that view, and the Editor even took his scepticism to the point of declaring that "the Author quite obviously will not expect gas engineers to accept this statement, unsupported as it is by any evidence." The absence of adverse comment from gas engineers (and constructional firms) suggests that they have worked the figures out and have been satisfied. But as there is a doubt about it, it is evidently necessary to give some basis for the statement. It is now proposed to consider all the objections made against the original proposal, one by one.

The Cost of Gas into Holder.

The initial article accepted the figures of Hunter and Stewart as indicative of the very best gas-making practice. As being more recent we will take Hunter's figures. Immediately there is a difficulty, because Hunter does not say of what size the plants were, nor what was their capital cost. We know, for example, that the coke-oven plant had a nominal capacity of 1,200 tons of coal a day, and was thus of a size comparable with few gas-making plant in the country. The low C.V. gas proposal is not to be confined to the great companies but is intended for the small and medium sized also. Another point to be noticed is that Hunter's figures refer to 1932, and thus the price of coal is less than to-day's figure. Fortunately, the price per ton is given. A third point is that the residuals from the high-temperature plant are different from those of the plant now suggested, and will command different prices.

The difference in the scale of the plant affects the capital cost. It is utterly impossible to say what would be the capital cost of a plant of the simple character envisaged by the writer to carbonize 500 to 1,200 tons of coal per day. By the time these plants arrived at this scale, they would probably be very different from present conceptions. There is also the difficulty of knowing exactly what parts of the plant have been included by Hunter. He gives the capital cost per ton of coal carbonized per day as:

Continuous verticals	£249
Intermittent verticals	£262
Coke ovens	£279
Horizontals	£260

These figures presumably mean the capital cost of the carbonizing installation with its coal and coke handling plant divided by the maximum rated daily throughput of coal. Alwyne Meade ("The New Modern Gas-works Practice," pages 30 and 32) gives the capital cost of a vertical retort installation with waste-heat boiler to produce a maximum of 11,400 therms per day of 475 B.Th.U. gas as £50,180; on the

assumption that the plant would produce 90 therms of gas per ton, this works out at £395 per ton of coal per maximum day, and even without the waste-heat boiler it is still £368.

This "coal throughput per day" basis of comparison appears to the writer to be misleading and prevents one plant being compared with another; we do not build retorts to carbonize coal, but to produce therms. It is thus better to base capital cost on the number of therms produced per maximum day. The figures then become:

	£
Hunter (large works)—	
Continuous verticals	3·11
Intermittent verticals	3·27
Coke ovens	3·75
Horizontals	3·49
Alwyne Meade (moderate-sized works)—	
Continuous verticals with W.H. boiler	5·28
Continuous verticals without W.H. boiler	4·90

It must be emphasized that these figures, and, therefore, the figures to be subsequently given for the plant for making low-grade gas, refer to plant of some 3 or 5 years ago, *i.e.*, when prices were lower than to-day. On the same basis as that given by Alwyne Meade, the plant for low C.V. gas production to produce some 2,000,000 therms annually, *i.e.*, 8,000 therms per maximum day, would cost about £30,000. No doubt there will be critics who will ask for proof of this unsupported statement also, but they will not have their desire gratified. It is possible for any constructional engineer with a knowledge of prices to check the figure approximately, and the writer must content himself by stating that it is based on ascertained prices. It will be noted that 2,000,000 therms per year is a moderate-sized works, almost identical with that envisaged in Alwyne Meade's book, but a little smaller. We have therefore:

Capital cost per therm for low C.V. gas plant, including plant for handling coal and coke	£3·75

Even in its present early stage of development, therefore, the capital cost of the plant for producing low C.V. gas for a moderate-sized works will be very similar to that of the present cost for large works.

The capital cost has been discussed in some detail because it represents in Hunter's figures no less than 12 to 17% of the total gas-making cost. It is obviously wrong to put the cost of the small plant for which figures are available against the cost of the very large plants in Hunter's statement. In the same way, the value of the tar oils per gallon is greater for low-temperature oils than for high-temperature on account of their value for hydrogenation. The coke produced in the process is very much better for domestic use (being as free-burning as Coalite) than is that from high-temperature retorts, and will, therefore, command a better price. For these reasons two cost statements are given, one of which accepts prices (other than for oil) exactly similar to those taken in Hunter's Paper, and the second accepts Hunter's figure for coal, but gives for other items the figures that would be realized in practice.

Before making this calculation it is necessary to determine the yield of products from the coal. It will be understood that gas coals as generally bought are unsuitable for an internally-heated retort, and the coals that will be used are the poorly-coking or non-coking high-volatile coals. These coals can generally be bought more cheaply than the gas coals. They give a low yield of coke, but a high yield of oils under the conditions envisaged.

The process has in effect three stages: The coal charged by skips or mechanically into the top of the retort meets the uprising hot gases and is subjected to low-temperature distillation; it is thus converted into semi-coke containing perhaps 8 to 10% of volatile matter, and much rich gas with all the oils is distilled off. In the second stage the semi-coke approaches the hotter zone and is further distilled, so that perhaps another 5 to 7% of volatile matter is evolved as lower-C.V. gas. Below this again is the producer zone. The retort is blown at the base with a mixture of steam and air somewhat similar to that of ordinary coke-fired producer practice, thereby generating producer gas of 115 B.Th.U. per cu.ft. The yields of gas per ton of coal treated in the three zones would be somewhat as follows:

		Therms.
Top of retort—		
Low-temperature zone:	5,150 cu.ft. of 700 B.Th.U. gas	36
Middle of retort—		
High-temperature distillation zone:	6,850 cu.ft. of 350 B.Th.U. gas	24
Producer zone:	36,000 cu.ft. of 115 B.Th.U. gas	41·4
Total	48,000 cu.ft. of 210 B.Th.U. gas	101·4

It can readily be calculated that in the producer zone 1 lb. of dry coke yields 85 cu.ft. of 115 B.Th.U. gas, this figure being needed to determine the amount of coke for sale. The raw coal will yield 12 cwts. of total dry coke per oven. To produce 36,000 cu.ft. of 115 B.Th.U. gas will require the gasification of 3·8 cwt. of coke. In addition, the blowers will require for steam the use of a further 25 lb. of coke (the breeze will be used for this purpose), so that the total raw coke available for sale will be approximately 8·5 cwt.

There is finally the question of labour. The small plant here envisaged will require more men than a mechanized large plant. It will require two men per shift, with perhaps an additional man in the day time; a larger mechanized plant would require much less labour.

Cost of Making Low C.V. Gas.

	(*a*) With same Prices as taken by Hunter.		(*b*) Probable Figures for a Large Plant Similar in Size to those given by Hunter.	
Therms made (200 C.V.)	Per Ton of Coal. 100		Per Ton of Coal. 100	
Coke made for sale, cwt.	8·0		8·0	
Breeze made for sale, cwt.	0·5		0·5	
Oil made, galls.	20		20	
	s. d.	s. d.	s. d.	s. d.
Cost of coal		20 9		20 9
Process steam (deducted from coke)		—		—
Less—				
Coke at 19s. 6d. a ton in case (*a*) and 25s. a ton in case (*b*)	7 10		10 0	
Breeze at 4s. 6d. a ton	0 2		0 2	
Oil at 4d. a gall.	6 8		6 8	
		14 8		16 10
Net cost of coal		6 1		3 11
Wages at gas-making plant		1 0		0 8
Wear and tear		0 3		0 3
Capital charges at 8·024%		2 5		1 6
		9 9		5 4
Cost per therm		1·17d		0·64d.

It will be obvious from the explanation given that the figure of 0·64d. represents the true comparison with the figures of Hunter that were quoted in the initial article. The price of the coal required for this process will be less than for the continuous vertical retort as in Hunter's statement, and it is considered that these figures amply prove the writer's original statement that gas can be made at 1d. a therm in a properly designed simple plant such as is here suggested.

Perhaps the most convincing statement that could be made is that those who do not believe should do as the writer has done—see for themselves. There is a plant in existence operating on lines similar to those here described in which there are produced 100 therms of low C.V. gas, 9 cwt. of coke for sale, and 20 gallons of tar per ton of raw coal. The plant is exceedingly simple, the upkeep is practically nil, and very little labour is required. It must be obvious to anyone with a knowledge of carbonization who has seen this installation that not only can it make gas in its present form at 1d. per therm, but that when given the same opportunities of development as have been given, for example, to the vertical retort it could be made an instrument for enabling gas to be produced more cheaply than any figure that can be dreamed of in our present plants. The installation that is in existence is situated, of course, at Nuneaton.

Gasholder Capacity.

As an objection it has been suggested that gasholder capacity would have to be increased because of the gum troubles. The reply is first that it is not certain that with a gas of this character there would be gum troubles. Certainly, information from the only town using 200 B.Th.U. is to the effect that gum troubles are unknown. Gum troubles are primarily associated with gas drying. The writer believes that this objection has no weight, and in any event the process described by Dr. Griffith at the last Institution meeting is available both for high or low C.V. gas.

Capital Sunk in Existing High C.V. Plant.

It is a frequent and well-known objection to change that capital must not be sacrificed. In answer, one has only to point to the success of the American method whereby any existing plant is ruthlessly scrapped if something better comes along. The real answer, however, is that no one would sug-

gest that large concerns should change over suddenly. Carbonizing plant has a habit of wearing out and needs renewal periodically. As units fall due for renewal, low C.V. plant would be installed in their stead, and the C.V. of the gas would be lowered in stages. In a very large concern, the change-over might take some time; in most concerns it would be effected in two or three stages; in the smaller concerns a single stage would be needed only. All depends upon how much of the total carbonizing plant can be rebuilt at one time. If we can multiply our gas sales by four by supplying cheap gas, should such considerations as these cause even a moment's pause in taking the necessary steps?

Suitability of Existing Appliances.

Investigation has shown the writer that those who put forward this objection are completely ignorant of the properties and use of low C.V. gas The change-over can be made without difficulty and leads to no such cost as the objectors appear to visualize.

Purifier Capacity.

Methods are known for dealing with large volumes of gas that are considerably cheaper than oxide purifiers. If the Gas Industry changes its practice in regard to gas production, the larger works at all events would also change their purification practice. There are signs that the oxide purifier will in any case be superseded ere long by plant that savours less of the dark ages.

Conclusion.

The writer in conclusion reiterates that he has discussed this important subject in a spirit of enquiry. If his investigations have convinced him of the truth of what has been put forward in these two articles, that is no reason to expect everyone else to be convinced upon his bare word. Most things can be proved or disproved on paper—the real proof is to see for oneself what can be done and what is being done. The possibilities of expansion if gas can be cheapened a little more are so colossal that the writer has deemed it to be his duty to bring before the Industry the facts here put forward. In all seriousness, the suggestion is made that the whole subject of cheapening gas production should be investigated in the light of the possibilities of low-grade gas, by the best brains of the Industry, unencumbered by the handicap of vested interests, and not hindered from reaching the truth by preconceived ideas.

High-Pressure Gas Distribution at St. Ives, Cornwall

by
F. R. G. GRANT,
Engineer, Manager, and Secretary of the St. Ives Corporation Gas Department.

The Presidential Address delivered to members of the Cornish Gas Association at a meeting held at Truro on Feb. 23.

When it was decided that Carbis Bay was to be incorporated in the Borough of St. Ives, the question at once arose as to how this added area was to be supplied with gas. In 1932, when vertical retorts were installed at the gas-works, provision was then made for the extra manufacture of gas so as to be able to give a supply to Carbis Bay when the time should come to do so. This left us with three problems—storage, mains, and pressure, the first and last of these applying to the old district as well as to the new one.

The existing storage capacity was already totally inadequate for the needs of St. Ives alone. The total amount of storage in the two holders was 90,000 cu.ft., and of this amount only about 50,000 cu.ft. was available for distribution at a suitable pressure. As the consumption of gas in the busy seasons, both summer and winter, amounted to about 160,000 cu.ft. per 24 hours, the addition of another holder became of the first importance.

Then there was the matter of pressures in the existing area of supply. In common with many other places the pressures, during periods of peak loads, fell to an alarming extent, and as the demand for further supplies of gas increased this trouble became more and more acute. This will be more appreciated when it is known that the output increased from 24 millions in 1926 to 44 millions in 1936, and also that the trunk main carrying all the gas from the works is only 8 in. in diameter.

This, of course, made it impossible to think of supplying the new area through the existing mains.

Thus two outstanding facts came to the fore for the old district, without taking into consideration the new area—namely, storage and pressure. I decided to install a complete high-pressure scheme as the only satisfactory and permanent means of overcoming these difficulties. The cost of buying land, at either St. Ives or Carbis Bay, as a site for a water-sealed holder—there being no room at the works—together with the cost of the holder and tank, and compressing the gas into a receiver was first considered. This I turned down for more than one reason. The cost was one, and a main one, but there were others, as will be seen later on in this Paper. I then decided to install a high-pressure static vessel of about 160,000 cu.ft. capacity at 50 lb. pressure per sq.in. This was to be spherical, as space was limited, and was to be erected on the site of the smaller existing holder which it was hoped could be sold, as it was in good condition. This was, however, objected to by the Ministry of Health in conjunction with the Board of Trade on the grounds that it was too close to a public highway, and that they were not prepared to take the risk of allowing it to be erected on that site. I would remark here that the Board of Trade has no objection of any kind to the erection of these high-pressure holders on a site which meets with their approval.

In the circumstances I decided on a cylindrical vessel of about the same capacity and pressure on another site at the works, and this met with the approval of the Ministry and Board of Trade.

The average gradient on this site was 1 in 3 and there was a large amount of rock, mostly blue elvin, to contend with. This could not be blasted with safety, as it was very close to the larger holder as well as the purifiers, and so had to be drilled and burst. This meant that the foundation work would be both difficult and costly. The whole of the work for the foundations was carried out by the Gas Department.

The foundations proper consist of six concrete blocks 17 ft. long by 3 ft. wide and 3 ft. 6 in. above the final ground level. The ground was excavated at the lowest level on to solid rock, and on this was built a retaining wall of an average height of 11 ft. and about 3 ft. thick at the bottom to about 2 ft. 6 in. at the top. The bases of the foundation blocks were brought up with this wall and forming part of it, so that the whole was formed into one solid block wherever they came. These blocks were brought up with the contour of the site until they reached the true and final ground level, and then built up to the required height above that. Another retaining wall had to be built to hold up and strengthen that part of the site which was above the ground level and at the back of the holder.

The amount of concrete used in this work was over 400 tons. It consisted of five parts beach shingle and one part cement, and was reinforced where necessary. Those of you who have seen the site before this work was carried out will

understand the difficulties which had to be overcome. We were fortunate, however, in being able to get solid rock for the foundations which have to carry so heavy a load.

High-Pressure Vessel.

This was designed, constructed, and erected by the Whessoe Foundry and Engineering Company, Ltd., of Darlington. I have no hesitation in saying that it must be one of the finest, if not the finest, piece of work of its kind which has ever been made. The erection of this vessel on such a site called for the greatest skill and care. It is 99 ft. long and 25 ft. in diameter, the ends being dished or egg shaped. The total weight is nearly 180 tons. The parallel part of the shell consists of 11 courses of 4 plates each, or 44 plates in all. Each of these plates is 29/32 in. thick and weighs about 2 tons 4 cwt. The joints are lapped and riveted together with two rows of 1 in. rivets. The ends have 12 plates each. These are $\frac{5}{8}$ in. thick, each weighing about 30 cwt.; these are lapped and riveted as above but with $\frac{7}{8}$ in. rivets. The whole of the shell is hand riveted. It is caulked inside as well as outside.

There are two manholes, one on the top and the other near the bottom. There are inlet and outlet as well as a safety and drain valves. All these are the best of their kind.

The valve stools and manhole frames have compensation rings and are riveted to the shell. Inside the vessel there are six very heavy frames, one on each part of the vessel which rests on the foundations. These are not riveted to the shell but supported. The vessel rests on 12 cradles, two on each foundation. Two of these at one end of the vessel are riveted to the shell and bolted down to the foundation; the others are riveted to the shell but are carried on rollers, these rollers being on plates which are bolted to the foundations. This means that the vessel is able to move or breathe without strain to itself.

The whole of the material used in this vessel was pickled—*i.e.*, immersed in a bath of phosphoric acid at the correct temperature—before leaving the contractors' works, and then given a coat of red lead paint while hot. This pickling process removes the whole of the mill scale and leaves the plate clean, so that all paint gets right on to the plate itself and not on those patches of scale which can be seen on plates not treated, and which are many times the source of rust. It is interesting to note here that after the vessel had been erected and riveted there were very few scratches to be seen on the first coat of red lead paint. This, I think, speaks for itself. In my opinion, the cost of this treatment of the material was fully justified, the more so in view of the situation of the works at St. Ives.

The insured working pressure of the holder is up to 50 lb. per sq.in., and at that pressure it has a capacity of 152,000 cu.ft. The safety valve is set to blow at 60 lb. On completion the vessel was subjected to a test of 70 lb., which pressure had to be maintained for a period of eight hours without loss, other than that due to temperature. The final test was witnessed by the inspector of the Insurance Company who have insured the holder. His own gauge was used and the pressure rose from 70 lb. to 71½ lb., due to temperature, and at no time did the pressure fall. It had stood the night before for 10 hours with a fall of 1 lb. due to the cold in the night. The holder has now been in use for about six months and is still bottle-tight.

Compressor.

Let me now say a few words about the works part of the scheme. The existing engine house had to be enlarged to make room for the compressor, gauge boards, and connexions. This was done by the Gas Department, who also fixed the compressor. The compressor, which is of the reciprocating type was made and supplied by Messrs. George Waller & Son, Ltd., of Stroud. It is capable of compressing 10,000 cu.ft. of gas per hour at a pressure of 50 lb. per sq.in. with a steam pressure of 80 lb. per sq.in. To come now to the governors fixed in the works. There are two sets of these. One to reduce the pressure in the holder to that required in the high-pressure main, and the other to reduce the pressure in that main to that required in the low-pressure trunk main from the works to the St. Ives district. Both these sets of governors are in duplicate. The high-pressure set regulates the pressure required in the high-pressure main and supplies all the gas to Carbis Bay. The holder pressure is on the inlet and the main pressure on the outlet. The outlet of these governors is also connected to the inlet of the other set mentioned above, the outlet of which is reduced to inches water column.

All the governors used on the works, as well as those at the Carbis Bay end of the high-pressure main were supplied by the Bryan Donkin Company, Ltd., of Chesterfield, and are of the Reynolds type.

The Mains System.

I now pass to the mainlaying part of the scheme. All the pipes used are of solid drawn steel coated with bitumen and doubly wrapped. They also conform to the latest standard specification. They were supplied, and the work of mainlaying carried out by A. S. Clark, Contractor, of Worcester. This work being successfully carried out and within the specified time. The Gas Department did all the service work and erection of lamp columns.

The high-pressure main, 4 in. in diameter, is laid from the gas-works to the former Borough Boundary, to where the old existing mains finished—a distance of 2,640 yd. This main was tested to a pressure of 30 lb., and had to stand tight for a period of eight hours, as the work proceeded. During the laying of this main sockets were welded on at various places on the route to enable pressure raising to be be carried out when and where necessary. When completed the whole main was subjected to a test of 30 lb. for eight hours, which was maintained without loss. Great care was taken to ensure that all the joints after being welded were thoroughly coated and wrapped before the trench was filled in. This is one of the most important and vital parts of the work when laying steel mains, and should have the strictest supervision, because on this coating of pipes and joints depends the life of the pipes. All the joints on these mains laid for this scheme were welded, and all specials were made by welding on the site.

This high-pressure main is connected to a set of district governors, similar to those at the works, and also in duplicate, which reduce the pressure on the outlet to that required for Carbis Bay—*i.e.*, 5 in. water column.

From the outlet of these governors a 5 in. steel main is laid right through Carbis Bay on the main road. This main was also tested to a pressure of 30 lb., the reason for this high test on what was to work as a low-pressure main is that at some future date, and for some reason such as having to move the gas-works, it might have to be used as a high-pressure main. This main is 1,360 yards long and will be extended as required. All sockets for services both for houses and lamps were welded on as the main was being laid. These were carried to the side of the road or footpath where possible so that the road would not have to be broken up again and so incur the very heavy re-instatement charges of the County Council. Branches for mains for existing and proposed roads were also made and welded on; these, too, were taken to the side of the road.

The mains in all the side roads are 3 in. in diameter and of the same specification as the others. They were, however, only tested to a pressure of 5 lb., as these will be permanently low-pressure mains. The length of these mains is 3,132 yd., and this brings the total length laid to 7,136 yd.

With reference to street lighting in Carbis Bay, there were 25 lamps in the main road. The columns, of the well type, made to my order, are 28 ft. above ground, have a mounting height of 25 ft. and an overhang of 6 ft. Where possible they are of staggered formation and are 150 ft. apart, some rather less than that. You will notice that this system is in keeping with the Final Report of the Departmental Committee on Street Lighting set up by the Ministry of Transport.

The lamps have four No. 2 mantles each and have clock controllers. On the side roads there are 36 lamps with three No. 2 mantles each and also clock controllers. The columns for these are also steel and have a mounting height of about 14 ft. The swan-necks for these are of a special pattern and were designed and made at the gas-works.

Working of the New Scheme.

Before the adoption of this high-pressure scheme there were serious drops in pressure in the old district, especially in summer season when so many hotels and houses were

dependent on us for a good supply of gas. To overcome this five governors have been fixed in different parts of the town where most needed. These come into operation as soon as there is a fall in pressure of about 4 tenths, and will keep the pressure at that no matter what the demand may be. If we find that more are needed then they will be fixed.

The station governor at the works is loaded to give a pressure on the outlet at 65 tenths in the 8 in. trunk main, as soon as this falls to 62 tenths. The district governors at the works come into operation and maintain that pressure no matter what the demand may be. It can thus be readily understood that in conjunction with the governors fixed on the district a constant pressure can be maintained all over the area of supply. During the period of our greatest consumption last August we did not receive a single complaint of poor pressure. That, to my mind, is very near to the ideal, and, what is more, the system is wholly automatic.

Just a word about compressing. If instead of the high-pressure holder we had installed a water sealed or waterless and a receiver of, say, 1,000 cu.ft. capacity at atmospheric pressure, then the compressor would have to be working practically day and night, at times very fast and at times very slowly. By having the high-pressure holder we only work the compressor for a few hours daily—in fact, we raise the pressure according to how much it has dropped the day before, and so maintain our storage. This means that compressing charges are very low, and this is a big factor in any high-pressure scheme.

I hope that I have been able to give you a general idea of a high-pressure scheme and our own at St. Ives in particular, but if any of you should be thinking of such a scheme or any other I will be very pleased to go much more fully into the details than can be done in a Paper of this description, and into costs as well.

Stores Control and Job Costing - - -

From a Paper read before members of the Scottish Junior Gas Association (Western District) at a meeting held at Glasgow on Saturday, Feb. 12—the PRESIDENT (Mr. R. A. MacLaren, of Newton-on-Ayr), presiding.

by

E. G. SMITH,

of Dumbarton.

Badly designed stores and involved clerical records are a burden to the undertaking and a hindrance to the operators, and can only result in the scrapping and rebuilding of the system, thus involving extra expenditure which could have been avoided.

The first step in preparing a suitable scheme at Dumbarton in 1935 was to catalogue all items of stock in such a manner that all articles of each type were grouped—*i.e.*, gas fires, brass fittings. This was done by going through the Purchase Journal and noting each appliance and item used over the preceding three years, as it is necessary to provide accommodation for units which are out of stock but in regular use and units which may be used on special occasions only but are bought more cheaply in quantity. This information was sorted and tabulated under suitable headings and to the appliances list a note was added of the short-life parts.

The catalogue complete, it was easy to determine the materials most suited to floor storage—*i.e.*, cookers, shelving, or bins—after which allowance was made for expansion. The floor area, in this case, being fixed, it remained to set out the shelving and bins to the best advantage. Steel equipment, being the most adaptable and having definite advantages over wood storage, was decided on, and plans and specifications were sent to several firms for tender. Here, again, we had to bear in mind that the equipment was at a later date to be transferred and must, therefore, be designed in units to permit of expansion or other adjustments if necessary. The equipment chosen conformed to these standards and has the additional advantage in that the pigeon holes can be increased or decreased as required by merely adjusting the dividing plate, all main members being left intact.

The equipment erected, the materials were transferred to the shelving and bins. This was facilitated by treating the materials as grouped in type and size from the tables already made. The store was then divided into sections, each with an alphabetical code letter, and the bins were given a numerical code and the combined codes used as the code for the item. Typed cards, bearing the name and number of the unit were inserted into the card holders which extend the full length of each tier of bins. The code was also applied to the filing of the stock cards in the stores office. The cards were grouped in sections A, B, and so on, with a master guide card, and the sections further sub-divided by extended cards into twenties 0-20, 21-40. Location boards were attached to each section and all the contents of the section grouped alphabetically with the bin number opposite (Nipples—A.21). This provided a means of reference for the store-keeper should be find difficulty in locating an item, or, if the titles became obliterated or the card be lost when the bin is empty, the unit provided for can be easily traced.

To provide an adequate check on all operations, twofold records are necessary.

(1) In the stores office where money values as well as quantities are noted.
(2) In the stores where only quantities are noted and operation is by the store-keeper.

The materials used were designed from standard forms, and I might stress that, in drawing up designs for printed forms or ledgers, use should be made of standard size forms wherever possible, as this keeps down initial cost.

The first essential in any store is a "Goods Received Book." A loose-leaf ledger was chosen, which serves also as an "Empties Returned Book."

The "Appliance Stock Book" is of the loose-leaf type, while small fittings stock is recorded on cards.

Operation and Control of Stores.

The test for any stores system is in the operating, and should be such that every item can be accounted for from the requisition for it to the passing of the account for its sale.

On receipt of an order from the consumer at the showrooms a job voucher is issued to the stores office, on which is noted the nature of the work and the material required. Should the materials be out of stock a numbered requisition for the items required and the name of the last supplier is passed to the engineer's office, a carbon duplicate being retained in book form in the stores office. The engineer puts the order through to the supplier who despatches the goods to the store, where they are examined and checked against the requisition and entered into the Goods Received Book. Duplicate invoices are sent to the engineer, the duplicate being forwarded to the stores, where it is checked against the Goods Received Book and the money values are entered into the proper columns of the stock book or cards. The materials having now come, the voucher is passed to the distribution superintendent for execution of the work. The job being issued to the fitter, application for materials is made to the store, where all issues are noted in the Day Book against the voucher number by the store-keeper. All issues, returns, and used, are entered on the back of the job voucher by the fitter in the columns provided, and on completion of the work he returns his voucher to the superintendent for inspection, and any material not required is returned to the store-keeper, who rules out the returns. After inspection, the voucher is returned to the stores office and the quantities having been checked off against the store-keeper's Day Book, are costed

and posted to the analysis summary and passed to the main office for rendering of the account.

Every morning the store-keeper adds the issues and subtracts the returns of the previous day and posts the quantities to the stock cards affected, and passes the day-sheets to the store clerk.

The store clerk in checking the issues against the vouchers tabulates all materials used and posts his quantities to the stock book or cards. The returns having been ruled out by the store-keeper, they do not therefore concern him. In many instances the jobs extend over a period of two or more days, which means that the stores have issued more material than can be accounted for by the Stores Office Ledger, as the vouchers are not returned until the job is complete. The clerk, therefore, retains the day-sheets with any outstanding stock and only returns them to the storeman, initialled and dated, when all issues have been accounted for.

This method of completing the double records relieves the storeman of the clerical work involved in accounting for outstanding stock, and when stock is taken the quantities outstanding, but not charged for, are easily obtained.

In dealing with contracts extending over a period of months, such as housing schemes, a separate sheet is drawn up and the issues noted from the store-keeper's Day Book, as these quantities, being abnormal, are dealt with as separate stock.

Stores Audit.

The addition of stores audit to perpetual inventory records is, of course, a necessity. Records indicate the quantity which ought to be in stock, but the actual can only be obtained by physical measurement. Complete physical inventory at the end of the financial year usually results in the concentration of extra labour on stock, to the neglect of jobs requiring immediate attention. Periodical checking of materials obviates any confusion, and this system has been adopted. Approximately 20% of the items are tallied each month, making two audits per annum, thus relieving labour at the annual stock balance, and resulting in earlier production of the stock values for the year. The audit is carried out by members of the staff employed out of the stores, and the forms used are run off on a duplicator.

At the end of each financial year the total stock is valued on the ledger figures, in order that the true state of the business may be ascertained. As already stated, each job voucher is posted to the analysis and the value of the materials used over the twelve months is obtained.

Job Costing.

Cost accounting has in recent years received more attention than hitherto, and its real value to industry is becoming more apparent. In many instances it was only when depression or severe competition compelled executives to make enquiries into the costs of production that the importance of costing was recognized.

Costing does not confine itself to a mere production of statistics, but yields information which is of paramount importance to a progressive concern, both in aiding control and as a guide to future policies.

The total expenditure involved in the supplying and fixing of appliances is comprised of price of unit, materials, labour, delivery, expenses, and oncost.

The derivation of each element is as follows:

(1) Price of Unit.—Cost price of appliance as charged by supplier, and is obtained from the Stores Ledger.
(2) Materials.—Materials used are charged at cost price against the job, and the values obtained from the stores records.
(3) Labour.—Charged at cost on actual working time on job.
(4) Delivery.—Charge per hour for own transport or hire.
(5) Expenses.—Expenses which are a direct charge against any job—*e.g.*, employment of other trades.
(6) Oncost.—This is obtained by dividing the proportion of overhead expenses allocated to chargeable gasfitting into the direct expenses of supplying and fixing the units and is taken to a percentage on the total year's working. The percentage determined is applied in the following year.

Costing and Its Application.

The sales policy of "Buy the appliance—fixing free" is now universally adopted throughout the Industry. This is, of course, an estimate based on the probable all-in cost of supplying and fixing the unit, and while it is a valuable sales aid it should be observed that an estimate is only an opinion and not a cost. The necessity for continuous examination of fixing charges immediately becomes apparent, as a sales policy for appliances without knowledge of the installation costs or consideration of the probable consumption and incidence of load might involve the undertaking in serious financial loss.

To illustrate this point of view more clearly I have chosen from the records the section dealing with gas fires, fitted over a period of fourteen months.

Month.	No. Fires Fixed.	Average Selling Price.	Profit.	Loss.	Total Fixing Costs.	C.P. of Unit.	Material.	Labour.	Delivery.	Expense.	Oncost.
		£ s. d.	s. d.	s. d.	£ s. d.	£ s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1936—											
November ..	41	3 2 4	0 8		3 1 8	1 18 4	9 5	8 3	0 4	0 2	5 2
December ..	57	3 3 8	0 9		3 2 11	1 19 6	9 10	7 4	—	0 1	5 2
1937—											
January	23	3 5 7		1 11	3 7 6	2 1 4	11 2	8 1	0 6	0 3	6 2
February ..	7	3 10 2	1 6		3 8 8	2 3 1	11 4	7 8	0 3	0 1	6 3
March	22	3 9 9		0 8	3 10 5	2 4 2	13 2	6 8	—	—	6 5
April	9	3 14 1	0 2		3 13 11	2 5 0	13 9	7 7	0 8	0 2	6 9
May	4	3 14 3	2 2		3 12 1	2 5 3	12 6	7 2	0 4	0 3	6 7
June	10	3 14 10	1 0		3 13 10	2 5 10	12 1	8 7	0 7	—	6 9
July	8	3 11 6		1 6	3 13 0	2 6 1	11 0	8 6	0 9	—	6 8
August	6	3 13 2		0 5	3 13 7	2 5 8	11 1	9 4	0 6	0 4	6 8
September ..	32	3 14 1	0 4		3 13 9	2 6 3	11 4	9 0	0 4	0 2	6 8
October	71	3 6 10		5 0	3 11 10	2 5 3	11 3	9 1	0 5	—	5 10
November ..	81	3 12 3	1 4		3 10 11	2 4 9	9 8	9 9	0 3	—	6 6
December ..	70	3 12 11	0 8		3 12 3	2 5 6	9 3	10 1	0 7	0 3	6 7

The foregoing summary indicates the fluctuations occurring in the costs of the appliances, materials, and labour, between November, 1936, and December, 1937, and in total represents a loss of £2 6s. 4d. on 441 fires fitted, or 1¼d. on each unit.

In December, 1936, the selling price of the fires were increased to meet the increase in manufacturer's costs, materials, and labour, otherwise a heavier loss would have resulted.

Let us assume that the selling price per unit had remained at £3 3s., the loss would then have been £152 2s. 8d., or 6s. 11d. per unit sold, and could only have been recovered from the price charged for gas.

It might be argued that the methods employed do not take into consideration increased consumption or incidence of load, and this raises the question "Should gas charges bear part of the installation costs?" Unfortunately, the answer does not lie within the dictates of the Industry, as we are compelled to make sacrifices in certain fields due to the competition offered by our competitors. This does not, however, detract in any way from the value of statistical analysis, because they indicate the profits or losses on the fixing charges, and if a loss must be incurred to obtain or retain a particular field, then the amount involved should be accurately measured, examined, and if possible reduced. On the other hand, fields which yield a profit can be operated to a maximum, and the sales policy adjusted accordingly, thereby assisting the appliances which suffer from more direct competition.

Our ultimate aim is to encourage the consumers to use more gas, and the cheaper we supply our commodity to them the more beneficial and immediate will the results be to both.

I maintain, therefore, that it is our duty to examine carefully our distribution costs, and so direct the sales policy that the appliances we sell shall not involve unnecessary expenditure to the undertaking and create a burden to be carried on the price per therm. It is wrong to indulge in a throw-away policy by supplying to consumers appliances which their incomes do not permit them to use.

Discussion.

Mr. MACLAREN (Newton-on-Ayr), in opening the discussion, said that the main point was to sell gas, not appliances, and to obtain a reasonable profit on the gas and not on appliances. To make a profit of 10% on all appliances fitted was all very nice, but to have an increase of 10% on the output of the undertaking was very much better, and it might prove to be advantageous to lose a 10% on the appliance in order to gain a 10% on the output. He would like to ask Mr. Smith his definition of what was a chargeable and what was a non-chargeable job, and what percentage was added to his cash price when a consumer purchased an appliance on hire purchase or deferred system of payment.

Mr. STURROCK (Greenock) asked Mr. Smith why the numbers taken from the bins were not entered on the bin card immediately, thus avoiding duplicate work.

Mr. DAVIES (Alexandria) thought that all jobs done should show a profit, as any loss eventually fell on the price of gas. How did Mr. Smith derive his oncost charges?

Mr. BATEMAN (Kilmarnock) said he was interested in the figures relating to the number of fires sold over the last 14 months, which, he said, averaged out at about three per day. When the storekeeper was giving out small fittings, could he do so by weight or by numbers? How did Mr. Smith deal with storage of his cookers with a view to a saving of floor space?

Mr. KIRK (Motherwell) said that stores control was a subject which had given rise to much controversy, but there was no denying the fact that where there was a planned routine much time and money could be saved. The success of a well-run store depended not so much upon the layout of the store as on the personnel. Mr. Kirk wondered if Mr. Smith could tell them the oncost charge per 1,000 cu.ft. for a storekeeper, and if he had taken out any figures to prove that the storekeeper was paying his way. The idea of hanging a red disc on the bin when nearing re-ordering level was quite good, but what happened if a specific article fell below the minimum number before sufficient discs were shown to provide a carriage-paid order? Was an order made out for this specific article to the exclusion of the other articles nearing the replenishing number? Upon the receipt of an order from the consumer at the showroom, a job voucher was issued to the stores office on which was noted the nature of the work and the material required. This point required elucidating. When a consumer called and selected an appliance did the salesman pay a visit to the consumer's premises and then make out the job voucher, or was the job voucher made out and the fitter given a bundle of pipe and some fittings, and that not used then returned to the store? He did not imagine that even in Dumbarton the ordinary domestic consumer could specify the materials required.

Mr. L. A. NICHOL (Greenock) raised the point of how contract material was drawn from the store. Was the material put into the ordinary bin and when drawn as and when required, was it put in a separate bin for that specific contract?

Mr. WEBSTER (Port Glasgow) asked Mr. Smith how items were put under oncosts and how he dealt with material under capital.

Mr. GLEDHILL (Stirling) asked whether there was overlapping when there was a distribution store and a works store.

Mr. FULTON (Helensburgh) said he could remember the time when a fitter took a bundle of pipe and a few fittings to a job and it rested on that fitter to say if there was a charge or not. The question of keeping an accurate record of stores began to make itself felt when the number of fitters reached four and over. He would not attempt to criticize the system at Dumbarton, but would point out a little weakness in so far as the foreman had to measure the jobs, and there was no method of checking the material used on the jobs. An efficient storeman could reduce the non-effective working time of the fitter. This could also be brought about by an elaborate system of costing supervised by a man keen on examining all jobs and analyzing the facts obtained. He thought it desirable to make a little profit on appliances, but the main point was to get business. The late Mr. Yuill, of Dundee, and the late Mr. Vass, of Perth, were pioneers of the free-loan cookers, and they had demonstrated clearly that it paid them to put these cookers out on free loan. In regard to the pricing of appliances, their minds must be flexible on this point because of the charges made by competitors.

The Author's Reply.

Mr. SMITH, in reply, said that the ultimate aim was to sell gas, and the cheaper the price per therm, the more business they could do. What they lost on one field they hoped to regain on another. Referring to the charges added to hire purchase, these were approximately 5% for two years, 7½% for three years, and 10% for five years. In answer to the query on putting the numbers direct on to the bin cards, Mr. Smith thought that this was better done by putting a daily total on the card, as, in his opinion, this saved a considerable amount of work. Part of the storeman's duties was to ensure that the material was ready for the men to proceed to their respective jobs, and considerable time was thus saved. The selling price of any of the appliances depended upon the policy of the undertaking, but before the selling price was ascertained it was necessary to find out the total fixing costs and to decide what standard figure would be used. Regarding the derivation of oncost charges, it was very difficult to tie this down to specific headings, as each executive had a different opinion as to what constituted oncost charges. Showrooms which were also used for receiving complaints, &c., could not be wholly charged to fitting appliances, as a proportion should be charged to general establishment charges. Referring to the point on numbers and weights, Mr. Smith said that material was taken by numbers, and in the case of compo pipe this was done in feet. It was interesting to note that on test calculations compo pipe had been found to differ by as much as 7%. The storekeeper had a harassing job, and the success of storekeeping depended on the personnel. Referring to the material running too quickly out of stock, this was re-ordered immediately, but every endeavour was made to have the carriage-paid order, as all their fittings were under contract. In contract work, separate sheets were drawn up and when material was taken out these sheets were duly completed. It was amazing how the storeman could ascertain the rate of turnover and keep the material down to the minimum consistent with efficiency. The bins used were adjustable steel bins, and it was an easy matter to put in a division plate here and there where found necessary. These were also fireproof, and a certain amount was allowed off the insurance policy for fire. In dealing with the inspection of jobs, the foreman made a spot examination here and there while another man went round each of the jobs to see that the appliances were properly fitted and regulated and to check up on the material. Mr. Smith said that it was not possible for this man to check up all the material, since some of it might have been fitted under floors.

Western Junior Gas Association

Meeting at Bristol

On Feb. 26 members of the Association inspected the Barton Street Stoves and Distribution Store of the Bristol Gas Company. On this occasion the Association was honoured by the presence of the President of the Southern Association of Gas Engineers and Managers, Mr. D. C. Cross, Engineer and Manager of Lea Bridge and District Gas Company. An account of the Department and its working was given by Mr. A. B. Horsfield, Fittings Superintendent, Bristol Gas Company.

After a tour of inspection, the members proceeded to the Colston Street Offices of the Company, where tea was served through the courtesy of the Chairman and Directors of the Bristol Gas Company.

The thanks of the Association for the privilege of the visit and the excellent hospitality were expressed by the President, Mr. J. E. Akroyd.

In responding on behalf of the Company, Mr. S. E. Halliwell, Secretary and Commercial Manager, said the Directors were always very pleased to assist the Juniors. In regard to the reorganization at Barton Street, this had been carried out under somewhat trying conditions, as the Company's business had expanded rapidly while this work was in progress. The satisfactory outcome was due to the splendid work done by Mr. Noel S. Smith, Distribution Engineer and Sales Manager, and Mr. A. B. Horsfield, Fittings Superintendent.

Mr. D. C. Cross said he would like to speak as a member of the Association and say how much he had benefited by his visit that afternoon. He had also had an opportunity of seeing something of the Company's Chief Offices and Showrooms. He had been very much impressed by their magnificence from outside and inside, and complimented those responsible for the imposing outside display posters. He said this was the first visit he had made to an Association since his own Presidential term of office had commenced.

Mr. R. Robertson (Chief Engineer, Bristol Gas Company), Senior Vice-President of The Institution of Gas Engineers, welcomed the Juniors to Bristol again. He said also that he was pleased to welcome Mr. Cross, and wished him a very happy and successful year of office.

Gas Governors

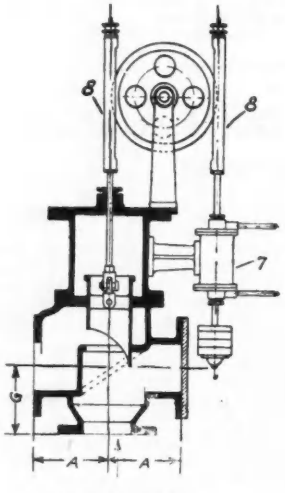
From a Paper read to a Joint Meeting of the Scottish Junior Gas Association on March 5, 1938.

by
W. CARMICHAEL PEEBLES

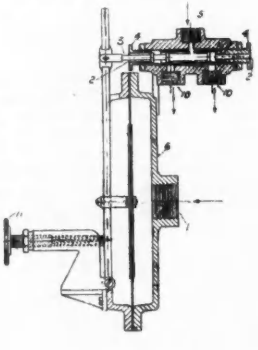
Never in the history of the great Gas Industry has the necessity for the control of gas, by governors of both volume and pressure types been so important as at the present time.

The Industry simply could not exist without these assistants in the distribution of its product and their variety is increasing yearly. The moment after its manufacture, gas must be controlled. Thus gas is drawn off by exhausters through a retort house governor, the object of such being to maintain a steady draw at any desired rate of flow, and managers aim now at level water gauge or 1/10th or so vacuum.

There are many forms of these governors on the market, one of the oldest being a butterfly valve invented by Newton in 1852. A later and more usual type consists of a valve connected to an inverted bell sealed in water. By means of a control, or impulse pipe as it is sometimes called, the conditions in the retort, if varying from the desired setting, raise or lower the bell and consequently the valve to a more open or closed position, according to the make of gas or the effect of varying pull from the exhausters. A more modern type brings in the relay system of control. The relay is acted upon by changes of the pressure conditions, and in turn operates upon the source of power, such as air, water, or oil under pressure, directing it to one or the other end of a piston to open or close the valve.



Cylindrical Valve.



The Relay.

The gas is now passed through scrubbers, washers, and purifiers, and then stored in gasholders. After passing through the station meter the gas is ready for distribution. Holders and containers are built for all sorts of pressures—holders up to 12 in. or 16 in. water gauge, and containers up to 50 or more lb. per sq.in.

Distribution questions now come in. How is the district to be served? There are at least four methods available:

(1) Individual governors for appliances.
(2) Service governors at inlet to premises.
(3) District governors.
(4) Station governors at the works.

Governor Types.

Modern station governors are made in many different forms. There is generally a bell carrying the valves, sealed in water to contain the gas, but a diaphragm has also been used. Various valve arrangements may be as follows:

(1) For low pressures: A single valve with a balancing bell of equal area to counteract the varying inlet pressure. The outlet pressure acts on the area of the underside of the valve.

Or (B), the above arrangement, with an outer concentric bell of large area to give power for more delicate governing. A pressure pipe is led from the outlet side under the large bell.

(2) A more usual form is provided with double balanced valves between which the varying inlet pressure is received. The outlet pressure acts on the top of the upper valve and underneath the lower valve. Thus the governor, so far as the valves are concerned, is completely in balance. The outlet pressure is brought back under the bell and is sealed off by a small inverted bell descending from the crown of the large bell. A tube through which the valve rod passes from the bottom of the water tank seals in the rod and allows movement of the bell and valves without friction. For safety I hold that all governors should be totally enclosed. If perforation of the bell does occur, only a very small quantity of gas will escape into the governor house.

(3) Small station governors are made with a bell sealed in mercury. These are suitable for small works and high pressure. Mercury as a seal is sometimes of advantage as it does not freeze nor evaporate under ordinary conditions.

The Methods of Loading are various:

(*a*) Direct weight loading on the bell or diaphragm.
(*b*) Adding to or taking off weights from a counterbalance arm.
(*c*) Loading or unloading by weight of water on the bell.
(*d*) Pressure loading by air or gas.
(*e*) Clock loading, by moving a weight by an electric motor or operating a pilot governor.
(*f*) Self-loading.

Let us now examine the methods a little more closely. They all, of course, depend on the required outlet pressure opening or closing the valves through the medium of the rise or fall in the outlet pressure.

It must be remembered that in any constant pressure governor the whole moving parts are in balance—that is to say, the weight of the bell and valves at any particular time gives the outlet pressure desired, and the power to raise or lower the bell is the excess over the desired pressure raising the bell, or, the weight of the bell and valves being greater than this pressure, opening the valves.

(*a*) *Weight Loading* is exceedingly simple. The attendant can be instructed to put on or take off certain weights at certain hours or work to a pre-arranged pressure chart.

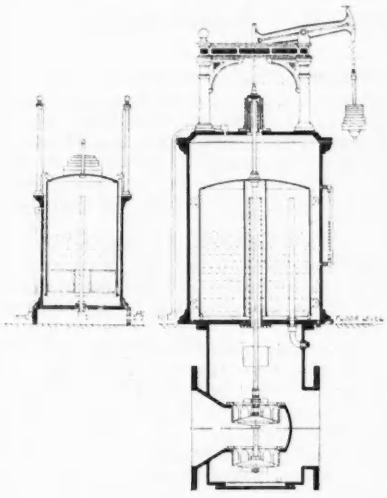
Weight moved by a clock.—The clock acts on electric contacts driving a small motor which moves the weight backwards and forwards on a lever resting on the governor bell, the other end being hinged.

(*b*) *Water Loading* requires a supply of water and a drain for used water; an adjustable filling water cock runs water on to the top of the bell so that the pressure required is arranged for at a definite time. When that cock is closed an adjustable drain cock unloads the governor in a certain time. An automatic overflow is arranged to prevent over-loading or undue under-loading.

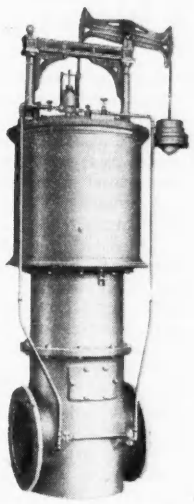
Pressure Loading by Air.—The air pressure is usually supplied by a separate air holder placed at any convenient distance and connected to the governor by a pressure pipe.

Attendance at times of change is required. One point of importance with air is that the air holder bell is loaded instead of the governor bell. It may be much smaller in diameter than the governor bell, provided its travel is sufficient for the cubic capacity required. Much smaller weights are necessary than for direct loading.

Pressure Loading by Gas, the Original Invention of the late Mr. D. Bruce Peebles.—A pilot governor receives the full inlet pressure and passes the gas to the chamber above the main governor bell or diaphragm. From there it passes on through a needle valve, forming an adjustable restriction, then on to the outlet main. Only small weights are needed to load the pilot governor. In order that the flow into the outlet main will take place the pressure of the gas above the main bell or diaphragm must be a few tenths higher than the pressure in the outlet main obtained by overbalancing the weight of the bell and valves by a counterbalance or a powerful float.



Pressure Loaded by Air.



Pressure Loading.

Advantages of Pressure Loading.

(1) The pressures are unlimited. The seal is almost level inside and outside of the bell.
(2) The bell is under no heavy strain, and the depth of seal need only be a little more than the travel of the valves from shut to full open.

Loading by a clock obviates the necessity of having a man in attendance. It may be arranged to act at peak periods only or continuously. For similar daily pressures a single cam clock can be used, or for different charts for special days, such as weekdays or Sundays, a double cam clock is available. The clock changes automatically at midnight on Saturday to the Sunday chart and back again at midnight on Sunday to the weekday chart.

Attached to the end of a lever for loading the pilot governor is a cup of mercury and a plunger, acted on by the clock, is pushed into or withdrawn from the mercury, using the buoyancy of the mercury as the actuating medium.

An alternative method is for the clock to move a weight directly backwards and forwards on a lever acting on the bell or diaphragm of the pilot governor.

Self-loading has been brought about by means of:

(1) The use of a Venturi tube, the increased flow increasing the pull under the bell so that a higher pressure is given as the load increases.
(2) Running mercury on to the bell as it sinks, and *vice versa.*

Self-Loading by Rolling Weight.

Many attempts have been made to obtain a governor which gives a valve opening proportional to the discharge. The governor now to be described does this and in a simple way. It, however, requires two governors. The first is termed a differential governor (*i.e.*, one acted on by two pressures) to deal with the changes of inlet pressure, as when different gasholder lifts are in action, leaving the second unit free to give the automatic changes of pressure due to variations required for discharge. The pressure being given by the automatic unit calls for more or less gas from the differential governor. The automatic unit is like a weight-loaded station governor with counterbalance. Attached to the valve rod by means of flexible rustless steel tapes is a curved arm centred on ball bearings a short distance from the valve rod. The steel tapes so tie the curved arm to it that no movement of the valve rod can take place without the curved arm moving also.

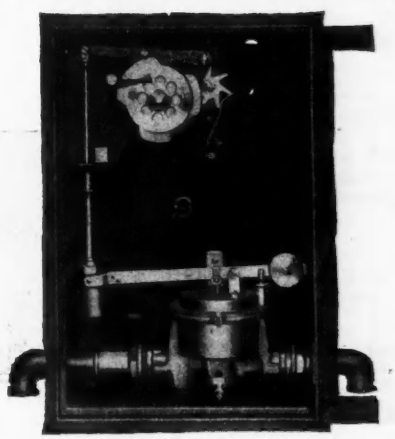
The whole moving superstructure, counterbalance, and curved arm are so balanced as to be stable in any position. The governor now would act like an ordinary static station governor already described, giving a constant outlet pressure. Put the rolling carriage on with the necessary loading weights, however, and we find that as the governor opens or closes the curved arm causes the rolling weight to take up the lowest position of the arc for the time being. The curve is proportioned to the required pressures from the governor, so that when the governor is shut the weight will be almost full out, and when full open, the governor giving its highest pressure, the weight will be close in to the curved arm bearing.

Self-Loading by Gas Pressure for High Pressures.

As the rolling weight would become cumbersome, pressure loading is adopted. The pilot governor instead of carrying a cup on the end of the lever has a dipping rod and the mercury is carried on the valve rod of the self-loading unit. As the governor opens and closes to meet demands for gas so the pilot governor throws more or less pressure into the governor bell, giving an increased or decreased pressure proportioned to the demand.

For example, take an ordinary station governor giving 5 in. constant pressure at its outlet, while consumers, two or three miles away, have variations from maximum to minimum demands of 5 in. to 2 in.—that is, 3 in. difference. Now with an automatic governor in action, increase the pressure 1½ in. at maximum demand by the rolling weight and the distant point will be increased from 2 in. to 3½ in. As the demand falls off the governor closes and the weight runs out, gradually reducing the pressure at the works to, say, 3½ in.

At the minimum demand there will be little loss of pressure so the pressure at the station will also be very nearly the pressure at the distant point. The maximum difference is now only 1½ in., and there will be a point in the main where there is practically no difference; this point can be moved nearer or



further away by loading or unloading the carriage carrying the rolling weight. The aim should be to get a nearly constant pressure at the centre of gravity of the system where the largest number of consumers would be affected. The consumers near the station governor will have had their pressure increased 1½ in., but the greater number will have a less variable pressure than before.

I have now described some of the station governors avail-

able and their various methods of loading, but this only goes so far in our distribution problem.

The gas engineer, or the distribution engineer if the area is large enough to require one, is all the time endeavouring to give his consumers an adequate supply of gas at constant pressure. But with the best intentions in the world he cannot foresee how a district is going to develop. When laid the size of mains were then no doubt considered more than ample even taking a long view of future requirements, but developments may have taken place out of all considered proportions. The pressure must be increased, but this will affect all consumers. District governors then come to his aid.

District Governors.

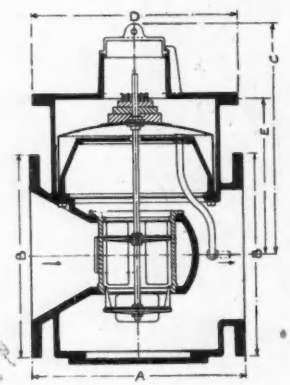
There are three types:

(*a*) Differential governors for hilly districts.
(*b*) Constant pressure governors giving, as their name implies, a constant outlet pressure against varying inlet pressures and flow.
(*c*) Self-loading governors.

(1) The differential governor reduces the pressure at its outlet by a definite number of inches or tenths, and follows the variations of pressure being given from time to time by the station governor. Thus on a main rising, say, 100 ft. above the station governor, the pressure will have increased due to elevation probably 1 in. The differential district governor will reduce this increase as required and continue to give constant outlet pressure against varying demands for gas. If, then, the station governor is loaded to give more pressure a very similar increase will be given by the district governor.

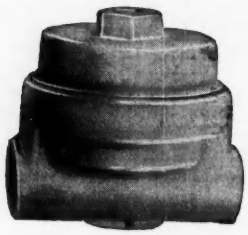
(2) The constant pressure governors are usually made with a diaphragm or metal bell sealed in liquid, such as oil, glycerine, or mercury. Mercury is more usual as it does not evaporate or freeze, and owing to its weight or specific gravity requires a comparatively shallow seal. Valves may be of the single or double balanced types. Diaphragm and mercury sealed district governors have been regularly made for 10 lb. inlet pressure, breaking down the pressure in one step to low outlet pressures. District governors may be loaded just as station governors are. A very common method of loading is by air pressure. A small holder placed in a cellar, or street pillar-box, with the air pipe carried underground is very convenient as the pressures may be altered at any time of the day or night without disturbing traffic in the street or road.

Clock loading for these governors is now quite usual, varying the pressure to a definite timetable, and, if necessary, giving automatically a different chart for special days, such as Sundays. The change is usually made about midnight on Saturday for Sunday, and Sunday midnight back to the weekday chart.

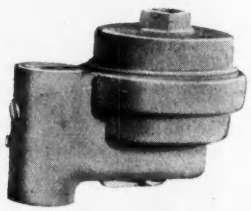


The main governor is weighted to just above the maximum outlet pressure required. The pressure from the pilot governor then is used to lift the bell or diaphragm the necessary amount for the pressure required at a particular time. The inlet pressure is led through a small governor past a needle valve which restricts the flow; this is branched, one branch to the underside of the bell or diaphragm of the main governor, the other continued on through the pilot governor to the outlet main.

The action is as follows: A certain pressure is being given by the cam acting on the lever of the pilot governor, through either the sliding weight or plunger in the mercury cup. Should the demand fall off, the increased pressure closes the pilot governor, with the result that the pressure builds up under the bell or diaphragm of the main governor. On the other hand, if the pressure falls, the pilot governor opens and the pressure under the main governor bell is reduced, allowing the loading weights to act and open the main valves as much as is required to establish the correct pressure. At the same time the clock may be acting, increasing or diminishing the pressure, the governor being free to deal with increased or decreased consumption.



Horizontal Connexions.



Vertical Connexions.

Service Governors are made with single valves, or with a single valve and a balancing diaphragm, and with double balanced valves. All may be carried by a diaphragm or metal bell sealed in mercury or, as manufactured by one maker, with a close-fitting piston.

Loading is usually by weights placed directly on the bell or diaphragm to give the outlet pressure desired. The connexions of the diaphragm type may be horizontal or vertical and the governor is also made to give an increasing outlet pressure against an increasing flow.

For boosted pressures a diaphragm governor is made with a powerful internal lever action, reducing pounds pressure to low pressures for consumers' use. There is a great variety of these on the market.

Appliance Governors.

We now come to the governor for the individual appliance, such as for gas fires, water heaters, bakers' ovens, stoves, and fittings of all kinds.

Their use is extending rapidly, as it is being realized that the input of gas to an appliance is all-important. The type of gas being manufactured at one period may be slightly different at another although of the same calorific value and specific gravity, and its value will vary in every town, with the result that the aeration necessary may vary considerably. Add to this, variation of pressure conditions and we are not giving the best efficiency. The varying pressure trouble may be overcome by the use of individual governors at each appliance, giving a constant pressure irrespective of varying inlet pressure and consumption. Again, water heaters and ovens with luminous flames are sensitive to variations in the supply due to pressure changes, especially with higher pressures than required.

Appliance governors may be either of the pressure or volumetric type. The pressure type may be made to act as a volumetric governor by the application of a fixed or adjustable orifice, but a more usual volume type is in the form of a metal cylinder with a disc or float moving with the least possible friction and balanced between two pressures. The action generally is as follows:

When the gas is first admitted, the disc rises momentarily to its highest point, closing the outlet orifice until the gas passing through adjusted holes in the float or disc tube enters the chamber above the disc. The weight of the disc then causes it to fall, but only until the weight of the disc *plus* the reduced pressure above it equals the initial pressure. It floats up or down under all changes of the initial pressure, thus keeping a constant flow to the apparatus.

Street Lamp Governors.—These are made in various forms

for upward or downward flow, both in the volumetric and constant pressure types.

The pressure type follows the design of the diaphragm service governors already described, though modified to suit street lamp conditions, and for upward or downward flow. They may, of course, be used for appliances, for which they are suitable as to capacities and pressure required.

The governor is an instrument of precision and must be maintained in good order to give best results. If there is moisture, dust, rust, and tar or naphthalene present in the gas, it will be seen that proper maintenance for such a mass of governors would at present be a serious difficulty.

The ideal condition of supply is constant pressure to all appliances, night and day. When once set with proper air adjustment for the input of gas of any particular calorific value, the appliance will then give the highest possible efficiency.

The whole subject of gas governing, as I said at the beginning, is a most interesting study and gives ample scope for all sorts of designs. I hope these short remarks have been of some interest and sufficiently detailed in the time at my disposal.

Discussion.

Mr. Rea called on Mr. MacLaren, President of the Western District, to open the Discussion.

Mr. MacLaren expressed the thanks of the Western District for the invitation to Edinburgh to hear Colonel Peebles. He asked what pressure was used in relays employing air. He thought that relays using water gave trouble, due to corrosion, and that air, oil, or rust-proof tubes should be used to get over this trouble. Where water-sealed retort house governors were employed he thought that an oil film should be introduced, as this helped to prevent corrosion. With regard to district governors, while the diaphragm type was cheaper, unless the leathers were oil-coated they were liable to give trouble. He had had experience of Reynolds high-pressure governors, and thought that some form of automatic lubrication was called for.

Mr. Greig (Glasgow) said that the use of safety relief governors should be universal. They should be fitted with a shut-off valve so that they could be cleaned periodically. Also, it was advantageous to introduce purified gas into the body of the governor; it prevented eddy currents of crude gas. With relief governors it was possible to vent the gas from the last retorts to atmosphere in the case of a shut-down and prevent small quantities of gas being carried in the mains.

Mr. Davies (Alexandria) asked how often relief governors should be cleaned, and if any precautions were taken in the event of the clock stopping. He asked what type of governor Colonel Peebles recommended for use in the retort house, relay or bell type. He had had an experience where the actuating arm of a relay type governor had been accidentally knocked off its seating, causing the butterfly valve to close, and the gas had become ignited on top of the bench. Fortunately, they had been able to right things before serious damage had been caused. If a relief governor had been installed there would, of course, have been no trouble.

Mr. Sturrock (Greenock) asked if all types of safety governors had to be hand operated after they had come into use. Did Colonel Peebles' firm supply cut-off governors for use with street lamps?

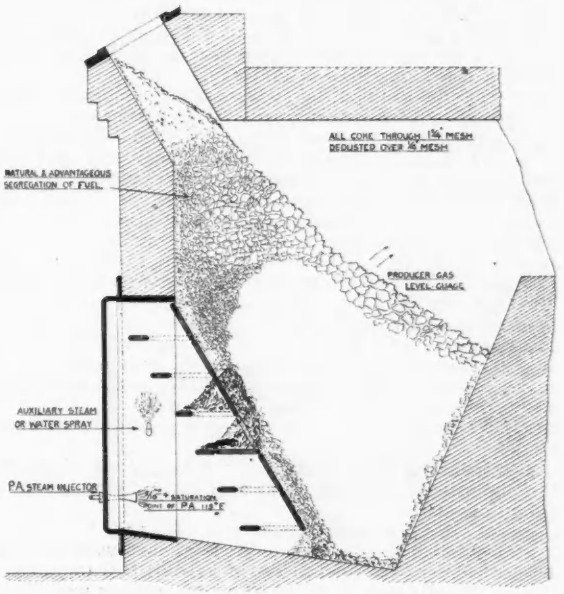
Mr. Rea said that he had had trouble with needle valves choking. He thought that some form of by-pass should be provided in mercury-sealed district governors to prevent the gathering of water which might give trouble by freezing and put the governor out of action. He thought the B.K. retort house governor was an ideal type.

Colonel Peebles, replying to Mr. MacLaren, said that the relay system required about 15 lb. air pressure; it was very useful to put oil on the water of water-sealed governors. His firm used Staybrite steel. Monel metal was also used in some cases. With regard to the diaphragm type of governor, they should be given periodic attention. Replying to Mr. Greig, he said that a supply of clean gas undoubtedly helped. He thought that the relief governor should be cleaned out every year. In regard to Mr. Davies' question about clocks, his firm used a very reliable and well-constructed type of clock, and they had received no complaints regarding failures. With regard to relay and bell type governors, he thought that simplicity was the determining factor. Mr. Sturrock had asked about safety governors. The type used in connexion with prepayment meters had to be re-set by hand. This ensured a reasonable degree of safety. The question of street lighting governors for cutting off the gas was no longer of importance, in view of the recently issued instructions of the Home Office. Answering Mr. Rea, Colonel Peebles said that a filter should be used in front of the needle valve. As to the question of water gathering, a drip might be incorporated, but due regard to the placing of the governor should be sufficient if allowance was made in the run of the pipes so as to ensure that no water would gather at that point. He agreed that the B.K. governor was very good. It was the result of much experimental work carried out at Beckton, where the facilities for such work were readily obtained.

A Composite Grate for Producers

As mentioned in other columns, at a meeting of the Western Junior Gas Association, Mr. H. J. Toogood described a producer grate of unusual design for which he has made application for a patent. The aim is to reduce the tendency towards clinker formation when gasifying coke breeze, and a sketch of the grate is reproduced here.

Mr. Toogood pointed out that when breeze is employed the fuel bed is denser than when large coke is used, and that the fuel contains more ash and in a finer state of division. The density of the fuel bed is readily overcome by using a steam jet to inject the primary air, maintaining beneath the fire a pressure of 3-5 tenths. Comparing step grates and bar grates, Mr. Toogood remarked that a step grate, by holding the ash stationary, tends to the formation of clinker, though it does permit the readier removal of this clinker once formed. Also, a step grate permits the primary air to enter the fuel bed more or less how it likes, resulting in channeling. On the other hand, a bar grate screens away some of the fine ash because of the gradual downward movement of the fuel and the face of the grate. It therefore tends to reduce the formation of clinker; but it does not allow of such easy removal of clinker as does the step grate. A bar grate distributes the primary air more uniformly over the grate area, which tends to check the development of "blow-holes."


ALL COKE THROUGH 1¼" MESH
REDUSTED OVER ¼ MESH
NATURAL & ADVANTAGEOUS SEGREGATION OF FUEL
PRODUCER GAS LEVEL GUAGE
AUXILIARY STEAM OR WATER SPRAY
PA STEAM INJECTOR

Mr. H. J. Toogood's Composite Grate.

The idea of Mr. Toogood's composite grate is to combine the advantages of the step grate with those of the bar grate. The usual solid horizontal steps of a step grate are perforated to act as screens, and are so spaced that they may be tilted into the plane of the fuel, and there secured to form a bar grate. The usual water trickle for cooling the ironwork is replaced by a water spray or an auxiliary steam jet, and each step of the grate is arranged to operate independently of its neighbours. Thus, when used as a bar grate, the gradual downward movement of the fuel tends to prevent agglomeration, and the grate serves to screen away some of the fine dust. The primary air is more evenly distributed and controlled. When the grate is used as a step grate the fuel bed can receive any needed attention in the easiest manner.

This composite grate, Mr. Toogood suggested, should go a long way to assist in the use of breeze in gas-works producers employed for heating the settings, particularly in works of medium size, where low capital outlay is of such importance.

Fitting Department Organization - -

by
A. B. HORSFIELD,
Fittings Superintendent, Bristol Gas Company.

From a Paper read to a meeting of the Western Junior Gas Association held at Bristol on Feb. 26 —the PRESIDENT (Mr. J. E. Akroyd, of Swindon, G.W.R.) in the chair.

Barton Street Premises, Bristol.

The Fitting Department originated at our Canons' Marsh Works in the year 1880, and it was only necessary for the one gas fitter to spend part time on this work. In 1888 our first fitter's mate commenced, and I had great pleasure in making a presentation to him last year on his retirement, his position then being District Foreman.

By 1907 the demand for appliances had outgrown the accommodation at the works, and the Department moved to more commodious premises at Colston Street, where a workshop and stores was specially fitted to deal with appliances and meters. Eventually a showroom was opened. By 1920 it became apparent that the accommodation at Colston Street would be totally unsuitable for such a growing Department, and in 1926 premises were acquired at Barton Street, St. James', which at that time were thought to be more than adequate. Time has shown that these "enormous" premises were not too big for a healthy business, and in 1935 steps were taken nearly to double the accommodation. The present floor area is 53,750 sq.ft., and the total employed is close on 500. Premises fronting to St. James' Barton are already in our possession and it is anticipated that in the near future the premises will be further increased to provide more adequate accommodation for our rapidly growing Industrial Section.

The Industrial Department deals primarily with industrial and commercial consumers and provides technical advice to the fittings staff.

Bristol being a provisional Industrial and Commercial Centre, the Industrial Section is in close touch with the latest developments of the application of gaseous fuel to industry. During the past year 5,224 visits and adjustments were made, and it is gratifying to note that some 61 million cu.ft. of our increase in consumption have been directly attributed to the efforts of this Section.

The Meter Department deals with the issue and return of all meters. Meter repairs, with the exception of small adjustments to prepayment mechanism and the fitting of index glasses, are carried out by the makers. Issues and returns are made out on Paragon machines, so that a record can be submitted to Head Office.

Meter Record Cards are kept in sequence of badge numbers, containing the full history of each meter from date of purchase until it is condemned. Meters leaving the district are tested. Meters found correct and sound, if not too old, are repainted and put back into stock for re-issue. It has been the policy of the Company to condemn over a period of years the lights type of meter, and this has had a beneficial effect in reducing the percentage of unaccounted-for gas.

The Meter Department tested in 1937 9,509 prepayment meters and 4,723 ordinary meters. The number of meters fitted on the district was 11,659. (This includes exchanges.)

The Maintenance and Complaints Department deals with escapes, bad lights, hired cooker complaints, maintenance of hire-purchase appliances, and periodic and free maintenance.

The advent of appliances combining intricate and scientific components has necessitated a different class of fitter to that formerly selected for maintenance work. When a man may be called upon to diagnose and rectify complaints on refrigerators, multi-point water heaters, flint and catalytic lighters, his training must be thorough and complete. These men are chosen from the best of the fitting staff, and any new developments in appliances are passed along to them at the earliest possible moment. The clerk in charge has had a good technical training in Gas Supply and is therefore able to talk intelligently with consumers and to gain first hand knowledge of their complaints, which might probably save hours of delay when the fitter calls.

Workshop and Establishment.

The work carried out here is varied, the principal being the renovation of appliances. The process of simple hire or black cooker is incineration, hand brushing, building, and repainting. The output per week is 250. On arrival at the workshop, after incineration at the Avon Street Works, the cooker is inspected by the foreman, who decides what new parts shall be fitted, brushing is completed, and the body is painted by hand. The type of cooker (mainly enamelled steel sides) does not warrant the use of spray pistols. The door is then bedded and the tap rail which preceded the cooker is affixed. The stove is then tested, given a second coat of paint, and passed for packing. Owing to the design of these cookers no steps have been taken to vitreous enamel the castings. The policy of the Company is to sell to its consumers modern "up-to-date" enamel cookers.

For those consumers who do not wish to purchase or hire-purchase an enamel cooker, the black or simple hire stove with its enamel sides and modern hotplate provides an economical and reliable cooking service. 8,646 of these cookers were renovated and fitted during 1937.

Renovation of high grade cookers (enamel with thermostatic control) consists of completely dismantling and washing the parts in a degreasing solution at 160° F. The cooker is then rebuilt and sold as secondhand.

"Bristol" Enamel Cookers (Terminal Hire).—Some 20,000 of these have been sold outright or hire-purchased during the past five years, and this has the inevitable result of a number being returned for diverse reasons. These cookers are reconditioned as new. The returned appliance is subjected to a critical examination and any portion of the enamelled surface which shows signs of wear or abrasion is sent back to the appropriate maker for re-enamelling. The usable parts are washed in degreasing solution, faulty plated parts re-chromed, and the cooker is rebuilt with new chromium plated screws, &c.

The workshop also repairs water heaters, makes sheet metal surrounds, canopies, &c., special burners, and apparatus for industrial installations.

The carpenters' shop builds up displays for the showrooms and district exhibitions, besides attending to maintenance and general work in the Department.

The General Office is responsible for the routine clerical work and compilation and filing of records of work done.

[The Author then outlined the procedure regarding fitting jobs.]

In regard to stores and costing, the stock is kept on

Roneodex cards, and a visible index gives easy reference to any item, of which there are some 7,000. The Stores Issue and Return Sheets are analyzed and postings made to the appropriate cards daily.

The clerk in charge of stores and costing sends out to the storekeeper each day a number of check sheets. The items to be checked are selected at random and a full check of the 7,000 items twice per six months is aimed at.

On return to the stores office the storekeeper's bin count is checked against the stock recorded on the card, and a date stamp is applied in red, so that it may be seen at a glance how many times the stock has been checked over a period. Incoming goods are posted to the stock cards from the Goods Received Book and prices are checked by invoice. Thus, when half-yearly audits take place, stock is visible at once and this secures a saving in time and a greater degree of accuracy.

General requisitions for stores are made each fortnight, and special goods ordered as required.

Wages are made up from the time recorded on National Radial Recorders, which are located in the workmen's entrance. The sheets are changed weekly and the clocks so adjusted as to show when overtime is worked. The time is entered into a loose leaf wages book after appropriations

Bristol Gas Company's Appliance Stores.

have been taken for statistics, the usual deductions are made, and the sheets are checked twice manually and once by comptometer. Payment is made by the Cashier's Department.

A record card is kept for each employee. This shows address, age, last employer, reason for leaving service, rate of pay, particulars of sickness, and report of conduct.

The transport fleet comprises twelve motor vans and one horse-drawn vehicle. The despatch dock is marked in bays. The loads for afternoon delivery are prepared during the morning, and those for morning delivery the previous afternoon. The transport clerk gives a daily report of work done and the mileage of each vehicle. During 1937 the fleet covered 122,775 miles, and handled 86,710 jobs.

Fitting Department.

The area is divided into four districts for gas-fitting, and each has its foreman. The foreman's duties are issuing work, maintaining discipline, and generally supervising the men in his charge. He interviews his men morning and evening and gives advice and instructions regarding the work to be done. He visits them while on consumers' premises and also checks the finished jobs for time, material, and workmanship. Each foreman makes out a Daily Report Sheet of calls made. A systematic check is carried out periodically, on which the whole of the foremen and inspectors are solely employed for one day.

Foremen and inspectors wear full uniform. Gas-fitters and others entering consumers' premises are supplied with uniform caps. Each fitter has his own locker and in the interests of cleanliness these are built with expanded metal doors. A large percentage of fitters and mates ride their own cycles, and a cycle dock to accommodate 400 is provided.

Attendance at Gas Fitting classes is one of the conditions of employment for fitters' mates, and facilities are given to fitters, and others, for technical training. The number attending during the current session is 98, and periodic reports are submitted by the Technical College regarding attendance.

Tools.

Fitters' tools are provided by the Company, and replacements are issued on production of the worn-out tool to the Chief Foreman. A record of tools issued to each man is kept, and inspection of kits is carried out from time to time. Large tools for iron pipe work are arranged in sets, each containing chaser pattern stocks and dies from ½ in. to 3 in. The sets are numbered and kept in specially fitted tool boxes, complete with padlock and two keys. These are issued from the stores and the fitter is responsible for their return in clean and good condition.

The issue is made on the Progress Form in black, and the return in red, as in the case of the issue of appliances or material.

Sundry materials, such as pipe hooks, nails and screws, solder, methylated spirit, flux, plaster, and cement, are issued at a special counter away from the general stores counter. The fitter makes out a requisition for this material and it is issued to his mate. In this way it is possible to keep a check on these sundry items.

The re-organization of the various Departments with a responsible official carefully chosen for each has done much towards promoting efficiency and co-operative effort. The passage of Progress Forms is smooth and information relating to work in hand is immediately available.

Discussion.

The PRESIDENT (Mr. J. E. Akroyd, Swindon, G.W.R.) introduced Mr. H. J. Toogood, whose life, he said, had been spent in the carbonizing industries.

Mr. TOOGOOD made some remarks on the modern tendency of breeze burning, and threw out a suggestion which he thought should interest young carbonizing engineers. This suggestion—a composite grate for producers—is referred to elsewhere in this issue.

Mr. A. BELL (Exeter) said he was envious of Mr. Horsfield's good fortune in having such a stores. He enquired whether normal or small high capacity meters were used in Bristol generally, and if the effect of benzole washing on meter leathers had been marked. Was a special dressing used? He did not agree with the difference in the type of fitter used for hire purchase and ordinary maintenance. With regard to cooker renovation, he had not found hand brushing satisfactory, and wondered why sand or shot blast was not used. He enquired about the cost of reconditioning returned cookers.

Mr. HORSFIELD, replying, said that normal high capacity meters were chiefly used, with both open and closed type valves. They had not found benzole washing to affect the dressing on the meter leathers. Makers' special dressing was used. Regarding maintenance, the hire purchase fitter had to pay calls where little, if any, work needed doing. It did not pay to put a first-class man to do this. Ordinary maintenance was different, as the man might be called upon to do work on a great variety of old and new appliances.

Hand brushing "old" cookers was the best way to finish off after incineration, as the castings were not of suitable finish for sand or shot blast. Regarding the reconditioning of terminal hire cookers, the amount of money spent was influenced by the amount that had been paid on the cooker.

Mr. NOEL S. SMITH (Bristol) spoke in appreciative terms of the work of the Author, and gave numerous figures to illustrate the vast amount of work which had gone through Barton Street since Mr. Horsfield had been in charge there.

Mr. A. G. HOLTAM (Cheltenham) asked what was included under free maintenance, also if there was any special reason why high grade cookers were not hired. With the system of job vouchers, was it possible for the fitter to have access to the vouchers during the day, or had he to see a foreman first? He wondered whether the random store check led to inefficiency. He would be pleased to know how the cycle allowance was arrived at, and would like some further explanation of the periodic check of fitters.

Mr. HORSFIELD, replying, said that no maintenance was really free. In the case of hire purchase appliances, allowance was made in the payments. Domestic maintenance was not charged.

Then there was periodic maintenance work done under contract for firms and business houses. Regarding the hiring of cookers, the policy of his Company was sell first, hire next. The fitter, or more generally his mate, had access to the voucher during the day; he asked for it at the fitting clerk's office. He did not agree that the random store check led to inefficiency. A certain number of items were checked every day. These were done from sheets which were issued by the stores clerk. The whole of the stock was checked twice in six months, and there was no overlapping. The cycle allowance was taken from tram fares. The periodic check of fitters was done by changing over the foreman of the various districts during the check, of such fitters as it was felt needed investigating, so that no foreman on these special periodic checks examined the work of his own regular men.

Mr. H. D. SULLIVAN (Plymouth) asked if he understood correctly that enamelled cookers were not offered to slot consumers.

Mr. HORSFIELD said this was so, and that they found the largest number of the terminal hire cookers went to this class of consumer.

Mr. F. G. CRAXFORD (Bath) said he noticed that reference was made to fitter and mate. Was this an unfailing rule? He would like to know whether it was the custom to get a signature on completion of the job, and if not, how a dispute about time was settled.

In replying to these questions, the AUTHOR said it was not essential to have the fitter always accompanied by a mate, but it proved in practice that he generally was. No signature was obtained on completion of a job. There were occasional queries about time, but not enough to justify resorting to this method.

The thanks of the members to the Author were expressed by Mr. A. TRAN (Bath), supported by Mr. A. BELL (Exeter).

Manchester and District and Yorkshire Juniors

Joint Visit to Messrs. W. C. Holmes & Co., Ltd.

Members of the Lancashire District and Yorkshire Junior Gas Associations assembled on the occasion of their joint visit to Messrs. W. C. Holmes & Co., Ltd., Huddersfield.

The annual joint meeting of the Manchester and District and the Yorkshire Junior Gas Associations was held on Saturday, March 5, when 200 members visited the Whitestone Ironworks of Messrs. W. C. Holmes & Co., Ltd. A description of the Works appeared in last week's issue of the "JOURNAL." After tea, Mr. Albinson (President of the Manchester Juniors) thanked the Directors of Messrs. W. C. Holmes for their kindness in granting facilities to the members to visit their Works. After inspecting the shops and the various jobs in progress, it could be seen that their reputation rested on sure foundations and was well merited. In addition to the actual manufacture and selling of plant, a technical service is also provided by the firm. A happy combination of chemical and engineering knowledge, business acumen, and service to the Gas Industry had built up a concern of world-wide reputation. Mr. J. H. Richmond (President of the Yorkshire Juniors) seconded the vote of thanks. He said that they owed the firm a deep debt of gratitude for the efficient arrangements made, and in particular for allowing them to see the manufacture of their meters. The name of Holmes stood very high in the Gas Industry, and in almost every Works their diamond sign was displayed. Their products had materially asisted, by scientific progress, in enabling the Gas Industry to hold and increase its load.

Responding to the vote of thanks, Mr. P. F. Holmes said that it was 60 years since he first set foot on the Works, and now Mr. D. Henshaw and Mr. Bryan Holmes had taken his place. Mr. Henshaw hoped that the visitors had enjoyed the afternoon, and pointed out that their latest development was the use of the Holmes washer for the removal of sulphur compounds.

Mr. Craddock (United Kingdom Gas Corporation) then read his Paper, which, together with the ensuing discussion, will be dealt with in a subsequent issue.

Midland Commercial Gas Association

At the Annual General Meeting of the Midland Commercial Gas Association held in Birmingham on March 10, under the Chairmanship of Mr. A. MACKAY (Stoke-on-Trent), the following Officers and Committee were elected for the ensuing year—namely:

Chairman.—R. S. Ramsden (Leamington).
Vice-Chairman.—J. Mitchell (Leicester).
Hon. Secretary and Treasurer.—A. G. Williams (Wolverhampton).
Members of Committee.—C. M. D. Belton (Shrewsbury) and G. P. Mitchell (Worcester).

An interesting discussion was opened by Mr. J. Mitchell on the subject of air raid precautions, with special reference to the experimental black-out at Leicester, which was described in the "JOURNAL" for Feb. 2. This is referred to elsewhere in this issue.

The concluding business of the meeting took the form of a presentation by Mr. A. W. Smith (Birmingham) of a clock and silver salver to Mr. A. G. Williams (Wolverhampton) as a token of the members' appreciation of the hard work he had put in in connexion with the formation of the Midland Coke Association.

In acknowledging the presentation, Mr. Williams said how much he appreciated the gift, at the same time paying tribute to the assistance that had been given by Mr. F. C. Briggs and Mr. R. A. Dry in forming the Coke Association, which was a great step forward for the benefit of the Gas Industry in the Midlands. He hoped that every undertaking in the area would join.

Interesting Reconstruction at Melbourne

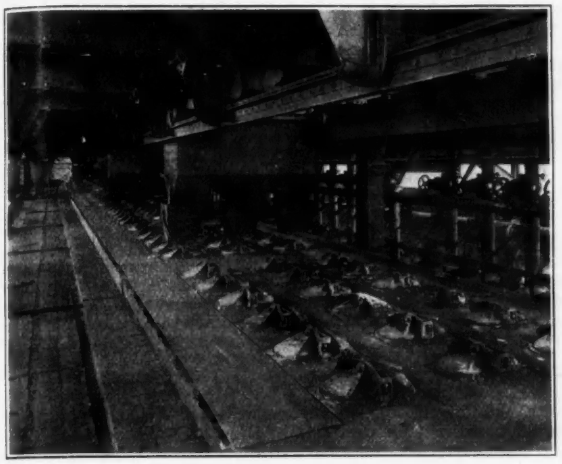


Fig. 1.

The carbonizing plant at the South Melbourne Works of the Metropolitan Gas Company of Melbourne (Chief Engineer, Mr. C. F. Broadhead) consisted of two benches of Dessau vertical retorts, one bench containing 6 beds of 18 retorts per bed, or 108 retorts in all, and the second bench 5 beds of 18 retorts, or 90 retorts in all. The daily capacities of each bench were approximately 1,200,000 cu.ft. and 1,000,000 cu.ft.

Early in 1935 it was decided to convert the bench of 6 beds of retorts to intermittent vertical chambers, and the contract for the work was placed with Messrs. Gas Chambers and Coke Ovens, Ltd., of London.

To avoid expense, and in view of the apparent good condition of the existing recuperators, it was decided that these should be retained, but that the existing producers should be modified in order to increase the grate area sufficiently to deal with the increased amount of coal that would be carbonized in the reconstructed plant.

The reconstruction also involved strengthening the existing buckstays and renewing them where this was found necessary, providing new intermediate buckstays, new bottom steelwork and bottom doors and frames, and re-modelling the staircases and platforms. The modification of the steelwork was done by the Metropolitan Gas Company's Construction Department from Messrs. Gas Chambers and Coke Ovens' drawings, as well as all demolition work, with the exception of the producers, which last was done, as far as necessary, by the Contractors.

Coal and Coke Handling.

The existing coal and coke handling plant was re-used after a thorough overhaul, but it was found necessary to renew the main coal storage hoppers, and owing to the increased throughput of the plant as compared with the original setting of Dessau vertical retorts the coal and breeze charging cars had to be modified and the hot coke guide had to be renewed. The charge per chamber was about 2 tons of coal, while 3 Dessau retorts (which each chamber replaced) held a charge of 8 cwt. each, or 24 cwt. in all.

The guaranteed capacity of the new installation was 1,910,000 cu.ft. of gas per day of 540 B.Th.U. per cu.ft., as compared with the original capacity of 1,200,000 cu.ft. of gas per day.

Work on the alterations to the producers commenced in January, 1936, when the clinkering doors had to be cut out, a considerable portion of the front walls cut away, and the old ashpans removed, together with a portion of the back wall. New ashpans, doors, and fittings were built in, together with steam injectors, to enable the producers to be operated under pressure should this be found necessary.

The reconstructed setting is illustrated in the accompanying drawing (fig. 2), from which it will be seen that the chambers were designed to accommodate the existing gas offtakes of the old Dessau retorts. This is also seen in the photograph taken on the top of the bench (fig. 1).

Refractories.

The Metropolitan Gas Company decided that the whole of the refractory material to be used on the job was to be made by the Darley Firebrick Company, of Bacchus Marsh—some 30 miles from Melbourne. This material is aluminous, and is capable of withstanding maximum flue temperatures of about 1,300° C., and it will thus be seen that the whole of the material for the work, apart from the bottom doors, was of Australian origin.

Bottom Doors.

The bottom doors and the operating gear for these were imported from England, since these doors are of the special design of Gas Chambers and Coke Ovens, Ltd., and are manufactured of Mechanite—a material unprocurable in Australia, and one that is free from the distortion and growth which occurs with ordinary Hematite castings under the conditions of temperature fluctuation to which these doors are subjected. They are of the metal-to-metal dry-sealed type, the seal being made between machined surfaces on the door frame and on the door itself, and are perfectly gas-tight. The doors are hinged and operated hydraulically, and in order to protect them against the heat of the chamber they are provided with renewable cast-iron hollow domes bolted on.

C.O.L. Intermittent Vertical Chambers.

In addition to the chambers, the burner walls have also been rebuilt to suit the C.O.L. multiple burner system of heating. The chambers themselves are built to the improved C.O.L. design, consisting of large tongued and grooved tiles, the walls of adjacent chambers being firmly bonded together with the C.O.L. special design of bonder tile forming the horizontal traverses or heating flues.

The heating of the chambers is accomplished by means of the C.O.L. system of multiple burners superimposed one above the other, as seen in fig. 2. In this way a number of combustion flues are provided, which not only avoids excessive velocities in the combustion flues, but permits of a reduced temperature gradient over the height of the chamber wall.

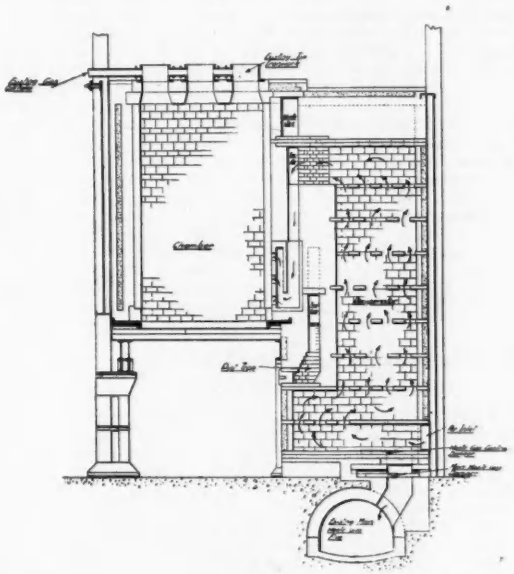


Fig. 2.

In connexion with the steelwork for the job, it might be mentioned that practically the whole of it was welded, only tacking bolts and rivets being used. The staircases, platforms, tie rods, buckstays, bunkers, handrails and standards, &c., were all welded, following the usual practice of the Gas Company's Construction Department.

The new work was completed during April, when drying fires were commenced, and the first charges were put in on June 1, 1936. The original retort house governor was found to be inadequate for controlling the pull in the foul main, owing to the

increased gas output, and an Arca regulator was eventually installed.

Operating Results.

Maitland coal, which is carbonized at South Melbourne, is a very good gas-making coal, and has an analysis approximately as follows:

	%
Moisture	2·27
Ash	4·67
Volatile matter	42·0
Fixed carbon	51·06

It shrinks considerably on carbonization, and there is no difficulty whatsoever in discharging it in intermittent vertical chambers. It had, however, been thought that the shrinkage would present difficulties to effectively steaming the charge, particularly with the comparatively low temperatures permissible with the Darley material, but during the test run 90 therms of 542 B.Th.U. gas were obtained per ton of coal carbonized, the contractors thus bettering their guarantees by 4 therms per ton.

When regular working conditions were obtained a curious phenomenon was observed—it was noticed that both the make of gas and the calorific value always dropped between the hours of 2.30 and 4.30 each afternoon. This occurrence was eventually traced to the segregation of the coal in the storage hoppers. These hoppers being only of 18 hours' capacity, the coal charged at 4 a.m., 6 a.m., and part of that charged at 8 a.m. consisted of large coal which had separated from the rest in the hoppers and which was burnt off more rapidly than when the fine coal was mixed with it and charged at the other charging times.

Since the plant has been at work still better results have been obtained than those obtained during the test run. For example, during the week ended Oct. 10, 1937:

Gas made per ton of coal carbonized	18,096 cu.ft.
Calorific value of gas	530 B.Th.U. per cu.ft.
Therms per ton of coal carbonized	95·9
Average daily make	1,954,000 cu.ft.

The average results for 26 weeks in 1937 were:

Gas made per ton of coal carbonized	17,301 cu.ft.
Calorific value of gas	542 B.Th.U. per cu.ft.
Therms per ton of coal carbonized	93·7
Average daily make	1,850,000 cu.ft.

Only during the above-mentioned 26 weeks was it possible to obtain these figures for the reconstructed C.O.L. plant at South Melbourne, since it was only during this period that the plant was working alone, and gas, coal, and other relevant figures could be measured.

Women's Gas Council

Birmingham Visit B.I.F.

Two hundred members of the Birmingham Branch again visited the British Industries Fair at Castle Bromwich this year, and spent a very enjoyable afternoon on Feb. 28 inspecting the exhibits on the various stands, particular interest being shown, as usual, in the appliances displayed in the Gas Section, where there is always something new to be seen in the way of labour-saving devices for the home, and consequently of vital interest to the housewife.

At the conclusion of the tour the visitors were entertained to tea at the invitation of the Fair Management Committee, and the Chairman of the Gas Committee (Councillor A. S. Giles) presided. He was accompanied by Mrs. Giles, who is a Vice-President of the Circle. The General Manager of the Gas Department (Mr. A. W. Smith) and Mrs. Smith were present, also Mrs. Higgs—wife of Mr. Walter Higgs, Member of Parliament for West Birmingham—and two other Vice-Presidents, Lady Davis and Lady Humphries.

Councillor Giles welcomed the visitors on behalf of the Fair Management Committee and in the course of his remarks touched upon the smoke abatement question, pointing out the assistance that could be given by the members of the Women's Gas Circle in furthering the efforts which were being made to reduce the pollution of the atmosphere by installing in their homes up-to-date gas appliances—such as they had inspected at the Fair that afternoon—and so help to minimize the use of open coal fires.

He mentioned that the growth of the Birmingham Branch of the Women's Gas Council—which was the largest in the country at the present time—was very gratifying, an increase of 600 members having taken place since they met at the Fair last year, bringing the total membership to nearly 1,400.

A vote of thanks to the Management Committee for their hospitality was proposed by Miss O. L. Humphries, and seconded by Miss K. M. Halpin, Organizing Secretary of the Women's Gas Council.

Invitation to Television Programme.

(By Our Woman Representative.)

On Friday afternoon of last week a number of representatives of the Women's Gas Council were present, by kind invitation of the B.B.C., at an exhibition of television at Broadcasting House. Among those who made up the party were Mrs. Corringe (of the Headquarters staff), Miss Page (also of H.Q. staff), Miss Prettejohn (of Messrs. William Coward & Co.), Miss Rampling (of the B.C.G.A.), and Miss Wilson (Editor of *Fanfare*).

It was the first time most of us had had the opportunity of witnessing a television programme; and it was a very interested party who were conducted to a basement studio where programmes from the Alexandra Palace are received. There were two television sets, but as the screens are so small it is only possible to accommodate a few "viewers" at a time.

Punctually at 3 p.m. the studio lights were dimmed, and the programme began; and for an hour-and-a-half we enjoyed the novel experience of seeing in operation this latest marvel of the wireless—which was briefly explained by a leaflet distributed to each of us. We had songs by Lina Menova, a cabaret performance, a humorous interlude, and the British Movietonenews. Of special interest was a demonstration by our old friend, Marcel Boulestin—well-known for the part he plays in the gas publicity films—of how, with the help of seasoning, butter, and cream, to make Rognons Flambés. He carried out this demonstration on the dining-room table over a spirit lamp; but doubtless had a gas ring been handy he would have used it!

To conclude a very delightful afternoon, we were shown trailers—the television people call them "pre-views"—of the following week's programmes, and we left Broadcasting House wishing we all owned television sets. It is gratifying to know that the W.G.C. are able to establish useful contact with the B.B.C.

Athletic and Social

Rotherhithe Co-Partnership Institute Annual Dinner.

As usual the annual dinner and concert of the Co-Partnership Institute of the Rotherhithe Station of the South Metropolitan Gas Company, which was held at the New Inn Restaurant, Westminster Bridge Road, on March 5, proved to be a most enjoyable function. That the attendance again showed a marked increase is not to be wondered at by anyone who has attended this convivial affair.

The Loyal Toast having been honoured on the call of the Chairman, Mr. T. A. Canning, Station Engineer, Mr. A. H. Andrews, Chief Engineer and Works Manager, proposed "The South Metropolitan Gas Company." He referred with regret to the enforced resignation through ill-health of Dr. Carpenter, in whom they all had a great friend. After paying tribute to the great qualifications possessed by Dr. Carpenter as an engineer—qualifications which were esteemed beyond the confines of the Gas Industry—Mr. Andrews went on to observe that it was with every confidence they now looked to their new President, Mr. H. F. Jones, and the Vice-President, Mr. A. M. Paddon, to further the interests of the Company. Mr. A. Lee, Employee Director, replied.

"The Borough and Trade of Bermondsey" was proposed in cordial terms by Mr. F. G. Brewer, M.A., Secretary of the South Metropolitan Company, His Worship the Mayor, Councillor A. N. Downing, J.P., replying.

"The Metrogas Amateur Sports Association" was proposed by Mr. H. P. Hollis. Mr. H. Putt replied. "The Guests" was given in happy sincerity by Mr. T. McSweeney, and replied to by Councillor Craigie, in the absence of Mr. V. Field. "The Chairman" was accorded musical honours on the call of Mr. W. Quinn; Mr. Canning briefly replied, wishing Mr. Quinn many happy years of retirement.

The speeches were interspersed with a programme of variety turns.

Gravesend and Milton Employees' Social Association.

The twelfth annual dinner of the Employees' Social Association of the Gravesend and Milton Gas Light Company was held last week. The President of the Association, Mr. W. A. Howie (Engineer and Manager), was in the Chair, and among those present were: Messrs. J. B. Lingham, J.P., and H. A. Porter, J.P. (Directors), Mr. H. A. Probin (General Manager and Secretary, South-Eastern Gas Corporation), Mr. W. A. Hammond (Secretary), Messrs. J. M. Loughland, T. H. Wallington (Brentford), W. H. Warren (Southall), of the Gas Light and Coke Company, and Mr. J. H. Hornby (Maidstone).

Proposing the toast of "The Gravesend and Milton Gas Light Company," Mr. W. A. Hammond said he was pleased to announce

yet another record year for the sale of gas and also appliances, due in a large measure to the foresight and ability of the Directors. The sales of appliances had increased by 15% to 20% over last year (itself a record) and of fires by 50%.

Responding, Mr. Lingham thanked Mr. Hammond for the very kind things he had said about the Directors. Mr. H. A. Probin also responded.

The toast of "The Employees' Social Association" was proposed by Mr. Harold Tuffee, Mr. E. Vaughan replying.

At this stage Mr. Howie presented Mr. Bernard Warner, to whom a great deal of the success of the Association was due, with a handsome chromium-plated smoker's stand. Mr. Warner briefly replied. "The Guests" were warmly welcomed by the President, and Messrs. W. H. Warren, F. C. Bedloe, and W. A. Stewart made entertaining replies.

Gloucester Sports Club Dance.

Gloucester Gaslight Company Sports Club held an enjoyable dance at the Cadena Café, Gloucester, on March 3, and about 250 people attended. Among those present was Mr. H. Leslie Boyce, M.P., a Director of the Company, and Mr. A. L. Morris, Commercial Manager. Mrs. Morris distributed the spot prizes, which were won by Mrs. Spencer and Mr. Major and Mr. R. Knibbs and Mrs. Cambell.

Music was provided by Al Durrant's Dance Band. The arrangements were in the hands of the committee of the Sports Club of which Mr. W. A. Chard is Chairman, and Messrs. W. G. Brown and E. Creese are Hon. Secretaries, to whom much of the success of the evening was due.

Castleford and Whitwood Gathering.

A company of 150 attended the 11th Annual Supper and Social of the employees of the Castleford and Whitwood Gas Company held on Feb. 25, at the Co-operative Hall, Castleford. Those present included Mr. H. L. Wilson (Secretary and Director) and Mrs. Wilson, Mr. W. T. Cliffe, J.P., and Mrs. Cliffe, Mr. G. S. B. Cliffe, and Councillor J. Dowding. Through the kindness of Mr. Twigg (former Engineer and Manager) and Mr. W. T. Cliffe (former Chairman) chocolates and cigarettes were provided for the party. The work of decorating the hall and making all the necessary arrangements had been undertaken by a committee comprising Messrs. H. Atkins, C. West, S. Price, J. Parrott, A. Atkinson, G. Redhead, and J. Walker, who were cordially thanked at the close.

Derby Company's Annual Dinner.

Mr. J. P. McCrae, the Chief Engineer, presided at the 15th Annual Dinner of the Derby Gas Light and Coke Company, held at the Assembly Rooms, Derby, on March 11. Mr. McCrae welcomed the visitors, who included a number of retired employees and former members of the staff. An entertainment was given by the "Gas-O-Lites" Concert Party, and a whist drive and dance followed, the M.C.s being Mr. Sellars and Messrs. S. Attenborough and E. Hemingway Jones.

Bryan Donkin Staff Dinner Revived.

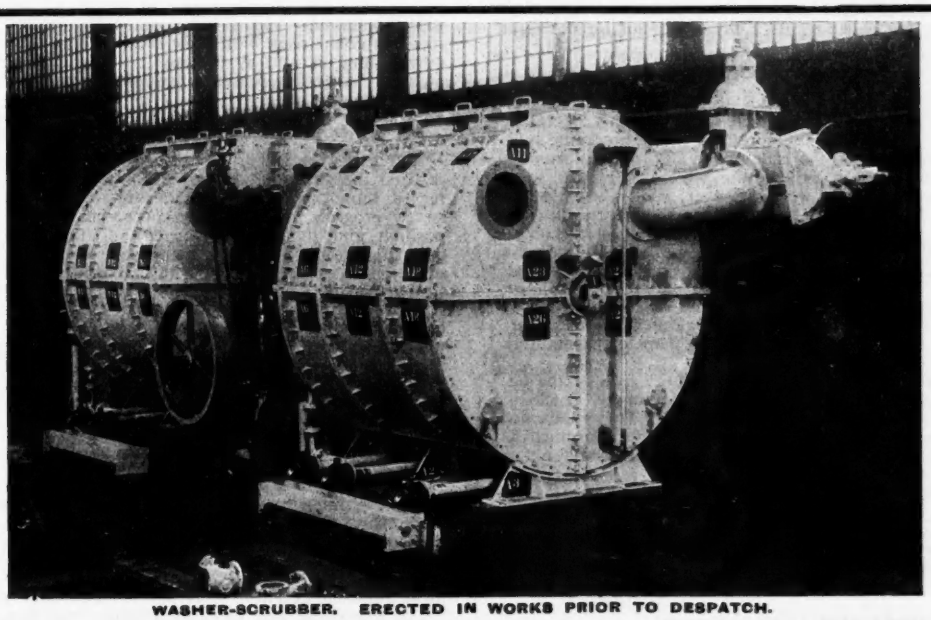
An annual event until 1914, when it lapsed owing to the war, the Bryan Donkin Company's staff dinner was revived on March 4, when Alderman G. Clark (Managing Director) presided over about 150 in the Station Hotel, Chesterfield. The Bryan Donkin Company, a Chesterfield firm, are associated with British Furnaces, Ltd., and the two Companies cover a wide field of engineering.

Long-Service Presentations at Reading.

At a gathering in the Social Club mess room at Reading Gas-Works on Feb. 16, three pensioners, Messrs. W. Digweed, R. Woodward, and A. Hardy, were presented with mementos of their long service with the Company, subscribed to by their fellow workmen. In the unavoidable absence of Mr. D. H. Helps (Engineer and Manager) the presentations were made by Mr. L. A. Rumble (Assistant Engineer and Manager).

Weston Staff Dinner.

The Annual Dinner and Social of the staff of the Weston-super-Mare Gas Company was held at the Melrose Café, Alderman Henry Butt, J.P., presiding, in the dual capacity of Chairman of the Company and Mayor. Responding to the toast of "The Chairman and Directors," proposed by Mr. E. Evans, a member of the staff, Alderman Butt referred to their guests from the Clevedon Gas Company, Col. S. Keen and Major J. H. Pye, with whom, he said, they had much in common. Col. G. Fleming proposed the toast of "The Visitors," to which Col. S. Keen responded. Mr. James Taylor (Engineer and General Manager) said that he was proud of the staff, and the interests of the Company were exceedingly well served by everybody. The Directors had always given great consideration to the members of the staff, and it was only to be expected that loyalty should result.



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COMPANY MEETINGS

Lea Bridge District Gas Company

The Annual Ordinary General Meeting of the Lea Bridge District Gas Company was held at 5, Great Winchester Street, Old Broad Street, London, E.C. 2, on Tuesday, March 8, 1938—Mr. ARTHUR M. PADDON, M.Inst.C.E. (Chairman of Directors), presiding.

The SECRETARY (Mr. Norman H. Davies) read the notice convening the meeting, and the Directors' report and statement of accounts for the year ended Dec. 31, 1937, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the Report and Accounts, observed that it might be appropriately said of them that they were a good deal better than they looked. As they were aware, there was a certain margin of discretion open to directors as to the results they presented at a general meeting. There were, of course, limits, but sometimes very favourable accounts could be presented in which the component items were not so creditable as in other cases. It was easy enough to show a profit legitimately by not dealing as generously or as liberally with the figures constituting the accounts as might be done. Such criticism, however, could not apply to the accounts before them that day.

In the first place they could congratulate themselves that—in spite of the fact that 1936 was a Leap Year and therefore had an extra day—the sales of gas during 1937 showed an increase of 1·58% where many other undertakings showed no particular advance.

Turning to the accounts, the Chairman said that the figures relating to capital spoke for themselves, and there was no cause for worry in that statement. They had spent on capital account during the year £16 541 and had written off £10,876, so that the total capital expenditure had been increased by between £5,000 and £6,000. This, associated with the increase in the Company's business, occasioned a slight decrease in the amount of capital employed per million cu.ft. of gas sold—small but on the right side.

Revenue Account.

On the credit side of the revenue account it would be seen that they had had an increase in each item, showing a total of £264,705—which was over £6,000 more than in the preceding year. But when they went to the other side of the account they found a series of large increases in expenditure which called for some explanation. These increases were, however, purely beneficial to the Undertaking by reason of the very valuable assets they represented. Coal had cost a little more, while repair and maintenance of Works and Plant were considerably more because they had been setting their house in order in several respects; they would receive the full value of the money so expended. Other increases were repair, maintenance, and renewal of mains—which was up by £1,200—and repair and maintenance of meters—an increase of £1,700. But all these were items of expenditure from which they obtained full benefit.

It would be seen lower down the expenditure side of the account that they had made the normal contribution of £1,826 to the Co-Partners' Contributory Pensions Fund. They had also paid £2,000 from revenue to the renewal fund, but inasmuch as they had extracted £3,000 from that account there was not a great deal of credit in that.

Expressed in terms of cubic feet—which was a form of measurement familiar to the older members of the gas profession—they had sold 17 millions more.

The total increase in revenue, therefore, amounted to £6,111, while the increased expenditure was £9,143; so there was a reduction of profit of just over £3,000 on revenue account.

Profit and Loss Account.

Turning to the profit and loss account, it would be seen, on the right-hand side, that they had transferred £1,500 from income-tax reserve account. Even after making that transfer they had still left some £5,467 on that special reserve—a sum which was more than adequate in anticipation of further charges on account of tax.

On the other side it would be seen that they carried forward £20,434 to the next account, which was £2,000 less than a year ago.

Reserve Fund, &c.

In the reserve fund account they would find the sum of £66,190 which was mainly invested outside the Company. The epitome of the matter was that this reserve fund account held two-and-a-half years' dividends, which was a figure rather in excess of that encountered in other gas undertakings in the Metropolis. The special purposes fund was also well invested. In the renewal fund, to which he had already referred, it would be seen that they had transferred £2,000 from revenue and taken £3,000, which was a normal form of accountancy. They were therefore £1,000 down on that account; but they still retained the ample figure of £13,647. In some instances this fund was invested; but it was mainly used in connexion with the revenue account to absorb inequalities in routine expenditure—so there was no reason to invest it at all and in their own case it was not invested.

General Balance Sheet.

Some interesting figures would be found in the balance-sheet. The sum total of investments of reserve and special purposes funds was shown at £88,697; but in a footnote it would be seen that they had a realizable value of £111,524, which was important in relation to the size of the Undertaking. Lower down on the same side they would observe that stoves, &c., on hire-purchase stood at nearly £70 000, but that did not include reserves they had made to cover maintenance and profit on future instalments. If they included the reserve, it brought the figure to £95,000 as representing their consumers' commitments in respect of hire-purchase.

There was nothing else to which he need call their attention except the item of stoves re-conditioning. This was the outcome of a very large programme indeed dealing with the transition from the black cooker for prepayment consumers to enamelled types—and prepayment consumers constituted a large proportion of their total. This transition was costing all undertakings in London a very great deal of money and was occasioned by the type of apparatus put out by their electrical competitors, who only started the race very late in history. The result was that gas undertakings had a great deal of antiquated apparatus to recall in comparison with their competitors. These cookers were now coming in, and by the next account that expenditure might possibly have disappeared; it would be a great relief to their maintenance charges.

Co-Partnership.

As regards the details of the co-partnership fund, if proprietors realized the value of co-partnership to undertakings they would regard those figures with jealous interest. The figures showed steady progress, and the effect of co-partnership on the general position and the earning capacity of the Company was very marked indeed. This movement depended very largely on the direction it received from the Executive Officers and the Co-Partnership Committee as the guiding agency, and on the co-partners themselves. But from whatever aspect they regarded it, he could assure the meeting that its development and continuance was satisfactory in—he might almost say—a complete degree. They owed a very great deal to all the contributing agencies—to Mr. Cross and the Co-Partnership Committee and to the loyal spirit it evoked from the employees. Without co-partnership they would have failed to produce such a statement of accounts as they had that day.

The Industrial Load.

The Chairman went on to refer to one other matter which was a peculiar feature of the Company's business—namely, the large element of the industrial load; 25% of their business, in fact, was connected with the supply of gas for industrial purposes, as compared with from 5 to 12% in the majority of other undertakings throughout the country.

The reason he mentioned this matter was that sometimes the industrial load was disparaged on the grounds that while they were selling more gas it was being sold at a disastrously low rate; in other words, they had to make considerable sacrifices in order to obtain the load. But it was erroneous to think that this load had little value. In endeavouring to introduce gas as an industrial commodity, consumers were apt to take a sheet of paper and say that the therm the gas undertaking offered them was, say, 5d., but that they could obtain that therm with oil at a cost of 4d. or, with coke, at a better figure than could be offered by gas. It was, however, only when they considered the use of gas for

industrial purposes that its particular value became apparent. With oil, for instance, there was not only the question of supply and storage to be considered, but also the use of mechanical and electrical mechanisms in its utilization, while with coke there was the same storage difficulty as well as the necessity for labour in respect of stoking and the removal of ashes, in addition to the uncertainty of the quality of the heat.

Biscuit makers had for long made the cost of the therm the sole criterion; but to-day gas was used almost entirely for this purpose and the benefit they obtained thereby was something they had never anticipated. Before they adopted gas the percentage of throw-outs was in the region of 20 to 30; but with gas that wastage was reduced to something like 4 or 5%—with obviously beneficial results.

In considering the industrial load people were apt to misconceive the situation in referring to the sacrifices made by the gas undertaking. They observed that their ordinary gas cost 9d. per therm, and, therefore, if it was supplied at 5d. to industrial consumers they were inclined to think that this was at the expense of the ordinary consumer. But the undertaking was selling a million cu.ft. to an industrial consumer through one meter, whereas the same quantity might be taken by 500 ordinary consumers through 500 meters and services, entailing all the other responsibilities of supply as against one in the case of the industrial consumer. That immediately qualified the question of price. That was only one aspect of the matter. Another was the period during which the load was required. The gas taken between 1 a.m. and 5 a.m. was of greater value to the undertaking than that taken only mid-days on Sundays. This question of industrial gas, said the Chairman in conclusion, largely determined the conduct and economy of gas undertakings, and the policy of the Lea Bridge Company would prove very useful in dealing with the matter in the future.

The CHAIRMAN then formally moved the resolution for the adoption of the report and accounts, which was seconded by the DEPUTY-CHAIRMAN (Mr. G. W. Carey) and carried unanimously.

Dividends.

The CHAIRMAN thereafter moved the declaration of dividends for the half-year ended Dec. 31, 1937, at the following rates per annum (all less income-tax), payable on Friday, March 11, 1938:

4%	on the	4%	preference stock.
5%	„	5%	„
6%	„	6%	„
8½%	„	consolidated ordinary stock.	

This was seconded by Mr. E. L. BURTON, F.S.A.A., and carried unanimously.

Election of Director and Auditor.

The CHAIRMAN then moved the election of Mr. E. L. Burton, being the Director retiring by rotation. In doing so, Mr. Paddon observed that in Mr. Burton they had a Director who left his mark upon the policy of any gas undertaking with which he was associated. He was a gentleman of almost unrivalled experience. Mr. Paddon said he had been associated with him for 40 years, and he antedated him in the Gas Industry. Mr. Burton was a man of very strong ideas, and they had had the benefit of his guidance and advice for many years, which was one of the reasons that the Company's position was so good to-day.

The resolution was seconded by the Deputy-Chairman, who endorsed all that the Chairman had said, and carried unanimously.

In acknowledgment, Mr. BURTON thanked the Chairman and Mr. Carey for their kind remarks.

The retiring Auditor, Mr. Hyde C. Burton, F.C.A., was unanimously re-appointed on the proposition of Mr. A. A. KING, seconded by Mr. A. E. HOBBS.

Votes of Thanks.

The CHAIRMAN proposed a hearty vote of thanks to the officers, staff, and workmen of the Company, which, the proprietors would appreciate, was very deeply due. It had not been an easy year, and it would not cheer them up to be told that next year would be more difficult still; but they would face it all the better in the knowledge of this expression of appreciation of what they had already done. All the elements in the Company were linked together under the system of co-partnership, as a result of a long association with which they had a singular cohesion and co-operation which reflected itself in the results. This very largely depended upon the executive officers; there was no one more sedulous than Mr. Cross in establishing and maintaining the principles of co-partnership, looking equally to the interests of the Company and the workers. In Mr. Davies they had a gentleman completely competent in his own sphere; they were relieved of any possibility of discrepancy in the figures while he was in charge of them. He hoped the meeting would pass this vote of thanks to all the employees from the top to the bottom.

The resolution was seconded by Mr. S. H. JONES and carried unanimously.

In acknowledgment, Mr. D. C. CROSS (Engineer and General Manager) said the employees had co-operated extremely well during the year for the benefit of the Company. There had been a keen spirit of co-partnership, which had a real meaning at Lea Bridge. This vote of thanks was something real, and he would have great pleasure in conveying it to the staff.

The meeting terminated with a cordial expression of thanks to the Chairman and Directors on the proposition of Mr. T. W. BAIRD seconded by Mr. D. C. ROBERTS, which was duly acknowledged by Mr. PADDON.

Brighton, Hove, and Worthing Gas Company

The Annual Ordinary General Meeting of the Brighton, Hove, and Worthing Gas Company was held at the Company's Offices, 5, Great Winchester Street, London, E.C. Mr. A. M. PADDON, M.Inst.C.E. (Chairman of the Company), presided.

Moving the adoption of the report and accounts, the CHAIRMAN said: We register a trifling decrease in the amount of gas sold, but if we take into consideration that last year was leap year with an extra day, that difference practically disappears and we stand really where we did a year ago in regard to sales of gas. We have spent during the year nearly £76,000 worth of capital, which has been reduced by writing off the sum of £39,000, leaving us with a net expenditure of some £37,000. Much of that is represented by our new showroom at Littlehampton and the rest of it in useful apportionments to our mains and to our meters. When we have done this our capital per million cubic feet will stand at £651, a figure on which we should be able to work very comfortably in the future were it not for difficulties which we shall have to face.

We have received over £4,000 less for gas. On a total of over £550,000 or so that is not very important as a percentage, but it is consistent with the slight decrease which I have already mentioned. In regard to rentals, we have received over £3,000 less, largely accounted for by the diminished rental received from stoves and fittings. That is a consequence of the transfer from simple hire to the hire-purchase system which has now become extremely popular. The next item is more encouraging. It shows that from residual products we have received nearly £10,000 more. That is due to the rise in the price of those commodities which enabled us to get back through residuals nearly 70% of the expenditure on the coal, oil, and coke carbonized.

Our consumers have increased by 2,285 although the bulk of gas sold has decreased, and this is a condition common to most gas undertakings in these days.

The Special Purposes Fund is £4,000 less than it was a year ago, and that is justified by the very liberal appropriations which I mentioned earlier. The total expenditure has increased by £2,337 and our receipts have increased by just under £2,000, so that the adverse balance on the whole working amounts to the somewhat trifling figure of £359 less.

In the profit and loss account there is a suggested appropriation which will take effect after this meeting of £3,500 to the reserve account. We brought into the account £48,100 and we take out of it £44,711, a difference of £3,390, once again more than accounted for by the appropriations to which I have referred.

The reserve account, which is of a fiduciary character, is invested independently of the Company's finance. It will amount to something like 2½ years' dividend, and in days like these that is a protection that is in no wise too ample. The special purposes fund is also invested to the extent of £43,000 and the renewal fund to the amount of £12,000.

On the credit side of the balance-sheet you will see a very important figure, stoves on hire-purchase, £136,684, which is the amount outstanding, less an ample reserve, and that will indicate to you the scope of this business and the importance to which it has risen in something like five years.

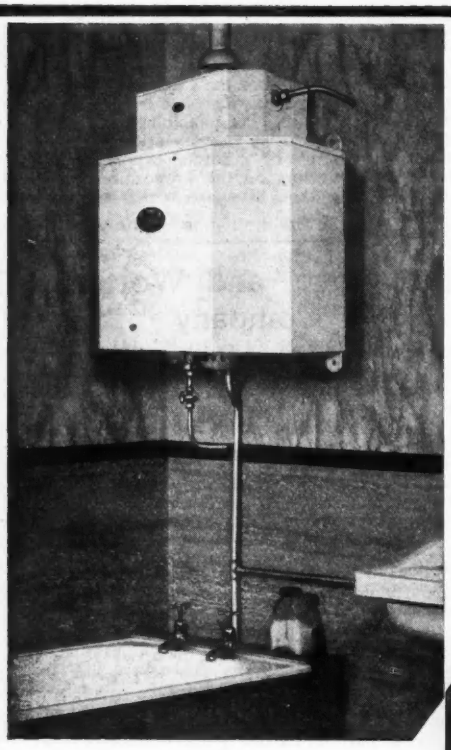
While our investments have a book value of £240,000, they have a market value of nearly £300,000. These seem very big figures, but I can assure you in the light of some experience that when once one begins to touch reserves they are apt to melt like snow in summer. The prospective demand on us in the matter of coal may suddenly require from current revenue something like £40,000 to £50,000, so you can see how essential it is that we should have our finances resting on stable reserves.

Mr. GASPARD W. CAREY (Deputy-Chairman) seconded the resolution, which was carried unanimously.

The proposed dividends were approved, and the retiring Directors and Auditors were re-elected.

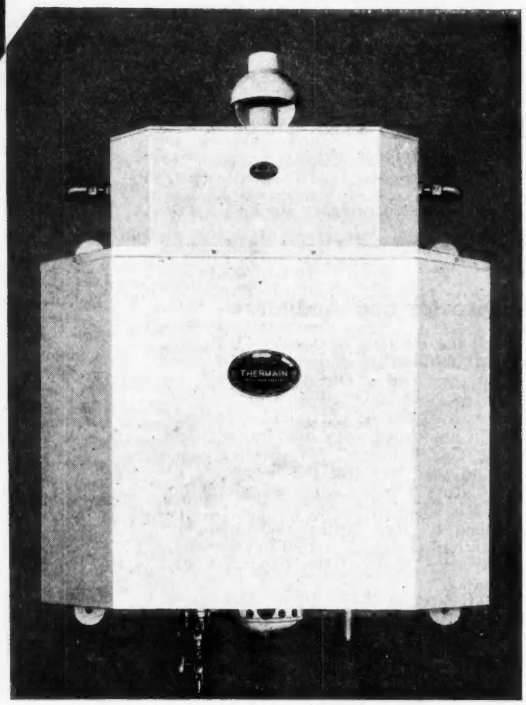
At a subsequent Extraordinary General Meeting resolutions were passed authorizing the Directors to raise further capital as provided by their Acts and Orders.

A vote of thanks to the Chairman, Directors, and staff concluded the proceedings.



For Hot Water at the Bath, the Lavatory Basin, and the Scullery Sink

- Rectangular in shape, and artistically finished in china white enamel.
- Capacity—14 gallons. Rating—10,000 B.Th.U. per hour (20 cu. ft. of 500 B.Th.U. Gas).
- Combustion Chamber — Non condensing, with protecting cover over burners.
- Water inflow governed by ball valve. Water temperature and gas rate governed automatically by Thermostat.
- An Integral Anti-down Draught Baffler is provided at the top of the Heater.



- This heater conforms to the requirements of the British Standard Specification for the Combustion Testing of Domestic Gas Appliances.

Specify

The Multi-Point "14"

★ Supplies of Literature for your showrooms can be had on application.

THERMAIN

Automatic Storage Water Heater

MANUFACTURED BY R. & A. MAIN, LIMITED LONDON & FALKIRK

The Sheffield Gas Company

Sales Up by Over 19%

The Annual Ordinary General Meeting of the Sheffield Gas Company was held on Monday at the Company's Offices. The CHAIRMAN, Lieut.-Colonel Sir Henry Kenyon Stephenson, Bart., D.S.O., LL.D, J.P., in the course of his Address, said:

It is the more satisfactory to be able to report that not only do last year's sales of gas constitute a new high record, but that the demands upon our output are still increasing. During the past year the Steel and Engineering Industries have been more fully occupied than ever before, not only on re-armament but also on peace-time requirements. The increase in your Company's sales of gas during 1937 was no less than 1,608 million cu.ft. or over 19%, the total sales reaching nearly 10,000 million cu.ft. This increase is the more remarkable when it is remembered that it comes on the top of one of over 20% in 1936 and over 16% in 1935. On one single day just prior to Christmas our output of gas exceeded 40 million cu.ft., which is 5 million cu.ft. higher than our previous record. I think it may fairly be assumed from these figures that gas is becoming increasingly a more important factor in both domestic and industrial life.

In spite of rising costs in many directions, including wages, no advance in the price of either domestic or industrial gas was made during the past year, but as, in addition to these increases, from Jan. 1 of the present year we have to pay a higher price for gas from the grid, your Board decided that it was necessary as from that date to advance the charges for industrial gas by d. per therm, or 1d. per 1,000 cu.ft. Having regard to the record of your Company for low-priced gas, I need not say that your Directors took this step with great reluctance, but they consider that even with this advance your Company's prices compare favourably with those charged elsewhere.

There is an increase of £30,000 in the Capital raised. This represents the Debenture Stock issued by the Barnsley Gas Company for which, under the terms of purchase of the Undertaking, your Company agreed to assume responsibility. The Account also shows our Capital expenditure during the year, including the cost of acquiring the Barnsley Undertaking as well as the outlay on the Gas Grid and the new Wincobank Works. In addition there has been the normal outlay on mains and meters necessary for connecting new consumers to our distribution system.

You will observe that in the exercise of the powers conferred upon us by our 1931 Act we have commenced to write off the Grid expenditure with an initial sum of £9,000 and your Board hope to continue this rate of contribution in ensuing years if not to augment it. Depreciation has been provided at usual rates. As a result of all this expenditure the Capital Account is now overspent by £177,412, but as the liquid resources of the Company are considerable this overspent balance is not of immediate importance.

The Revenue Account includes the results of the working of the Barnsley Undertaking for the period April 23 to the end of the year as well as the first full year of the Bakewell Undertaking of which only six months were shown in last year's accounts. Under these circumstances it is not very easy to compare the present figures with those shown a year ago.

Partly as a result of these added areas and partly owing to the continually increasing demand for gas in Sheffield the revenue from sales of gas shows a substantial increase. This increase would have been more but owing to the larger sales of cheap industrial gas the average price for gas in the Sheffield area has been brought down from 1s. 6½d. per 1,000 cu.ft. in 1936 to 1s. 6¼d. last year and this in spite of the fact that the price of all gas was increased 1d. per 1,000 cu.ft. during the last quarter of 1936.

Your Board are giving close attention to the matter of sales of domestic gas in competition with electricity and other forms of light and heat and have every reason to be satisfied with the results of their efforts in spite of various adverse factors.

We have had to provide a full year's interest on our 3½% Debenture Stock, as against four months only for 1936, and we have also had to bear the interest charges on the 5½% Debenture Stock taken over from the Barnsley Company. Your Board have been able to continue their policy of building up the Depreciation Fund as well as to inaugurate the "Network Redemption Fund" to which I have already referred.

Dividend.

Your Board are glad to be able to recommend that the Dividend should be at the same rate as for the first half of the year—viz., 3¼%, making 6½% for the full year.

I may perhaps be allowed also to point out the strong financial position which your Company enjoys.

Parliamentary Bill.

I must next refer to the Bill we are promoting in the present session of Parliament providing for, among other things, the extension of your Company's Coke Oven Gas Limits. As I explained at the Special Meeting of Stockholders held in December last, the promotion of this Bill has been forced upon us because powers are being sought for the formation of a Company to be known as the "West Yorkshire Gas Distribution Company" for the purpose of purchasing and distributing gas in an area covering a large part of the West Riding of Yorkshire. If these powers were granted by Parliament we should be precluded from extending our Coke Oven Gas Limits in the only area outside our present limits where supplies of coke oven gas are available to-day or likely to be available in the near future. The demand for coke oven gas for use in our present limits of supply continues, as I have already mentioned, to increase, and we have almost exhausted all available gas within our present coke oven limits. The area over which powers are being sought by this proposed new Company includes the County Borough of Doncaster and the surrounding district which your Company have always regarded as the area to which they should look for the natural and logical extension of their present coke oven gas limits when these were needed as they now are.

In this connexion it may not be out of place to remind you of the origin of the South Yorkshire Coke Oven Gas Grid.

The "Departmental Committee on Area Gas Supply" recommended in its report issued in March, 1930, that the establishment of a Gas Network in South Yorkshire was a matter of urgency and that it should be owned and operated either by the Coke Oven Owners and your Company jointly, or by your Company alone.

As a result of negotiations between the Coke Oven Owners and your Board it was arranged that the Grid or Network should be owned and operated by your Company, which should purchase the gas from the South Yorkshire Gas Grid Company, and this scheme was sanctioned by Parliament in our 1931 Act.

It is not too much to say that this system of co-operation between the Coke Oven Owners and your Company has proved a great success, but for the reasons I have given the time has come when we must go further afield for our gas.

The Board consider that your Company as the pioneer of the Grid scheme and entrusted by Parliament with its operation in South Yorkshire ought not to be denied the reasonable expansion which it is now seeking; still less ought a new Company without experience be allowed to be formed, the operation of which would make such expansion impossible.

Under all these circumstances there is every reason to hope that Parliament will have no hesitation in deciding that your Company, with its experience and record of success in operating the Grid, is entitled to the facilities for further expansion for which it is applying.

Apart from the extension of the Company's Coke Oven Gas limits, the Bill provides for the inclusion in its ordinary limits of supply of the Parish of Orgreave where it already supplies gas, as well as for the change of the Company's name to "The Sheffield and District Gas Company," which, having regard to the wide area now included in its limits of supply, will be a more appropriate description.

Some eight miles of Grid Main have been laid during the past year linking up the Corton Wood, Waleswood, and Dinnington Coking Plants and bringing its total mileage up to 56 miles.

Of the 19 Coking Plants which the Area Gas Supply Committee recommended as suitable to be included in the original Grid Scheme we have now connected up 13 and a main will shortly be laid to another—four of the remaining five plants have no surplus gas available and the fifth is so far away from the Network that it would not be a commercial proposition to utilize it at present.

Since the commencement of work on the Grid your Company has spent some £177,000 on its construction, to which must be added a further sum of approximately £182,000 for the new Works and gasholder at Wincobank to deal with the increased volume of gas brought by the Grid into Sheffield.

Mains and Services Extended.

The various sections of the Distribution side of your Undertaking have been fully employed during the year and good progress has been made. Further extensions of mains and services for the Sheffield Corporation's Housing Estates have been carried out, the number of houses covered being an increase on the

previous twelve months. On the other hand, there has been a slight decrease in private building. Altogether a total of over 57 miles of new and replacement mains were laid, while the number of new services was 4,790. 2,219 additional meters were fixed—the prepayment meter maintains its popularity—and the total number of consumers now on the books of the Company is 183,604.

The Sales Department has had an exceptionally busy year, as you will realize when I tell you that the money value of the domestic appliances sold either outright or on hire-purchase amounted to some £61,500, being an increase of nearly £22,000 on the previous year.

Perhaps I may mention a typical order secured against keen competition—this was for the installation of a gas cooker and a gas-operated refrigerator in each of 202 flats comprised in a block recently erected at Hillsbrough.

Referring to your Company's areas of supply outside Sheffield, you will be glad to hear that satisfactory progress is being maintained in spite of the fact that in all of them fierce competition has to be met. With a view to more economical and efficient working, the plants at Bakewell and Baslow have been closed down and gas is now being supplied to these districts from Matlock. For this purpose a length of over twelve miles of main was laid.

Additional business has been done in all these areas, not excepting Barnsley, which has been in our hands only eight months.

The change over to coke oven gas at the Barnsley Works was carried out on June 8 last, the main from the coke oven to the Barnsley Gas-Works having been laid by the Barnsley Gas Company prior to your Company's purchase of the Undertaking.

In accordance with the provisions of the Board of Trade Order the price of gas in Barnsley was reduced during the year from 4s. 4½d. to 4s. 1d. per 1,000 cu.ft. and a further reduction to 3s. 8d. took place as from Jan. 1 this year.

Public Lighting.

A five-year contract for street lighting has been arranged with the Dodworth Urban District Council and in other areas street lighting contracts have been renewed on satisfactory terms, in some cases with additions.

So far as street lighting in Sheffield is concerned, the position is prejudiced by the fact that the Corporation have their own Electricity Supply Department, but in spite of this an increased quantity of gas has been required for street lighting.

There are very few local authorities which obtain gas for street lighting at such a low rate of charge as the Sheffield Corporation do from your Company and it is not in the best interests of the ratepayers to displace gas by electricity either at the cost of efficiency or at an increased charge on the rates.

The development of our Publicity Department has continued and the increased sales of domestic gas appliances to which I have referred testify to its success. Upwards of 120 cookery demonstrations were given during the year with some 11,000 attendances.

As regards industrial gas the demand for gas-fired furnaces, both for light and heavy trades shows no signs of falling off, while gas is now competing successfully with alternative fuels for bread-baking and a number of gas-fired ovens have been supplied for this purpose.

As an example of how gas and electricity can run in double harness, one of our consumers who generates his own electricity has not only just replaced two old gas engines with complete new engines of modern design, but has also installed an additional twin engine set giving him a further 100 kilowatts.

Mr. Halkett has had a specially hard time lately as I am sorry to say that Mr. Halkett, Jnr., our Assistant General Manager, was the victim of a severe illness in the early autumn from which he is only now just recovering. We are very glad to have him back with us again. The results which I have had the pleasure of putting before you to-day offer, I think, conclusive proof of the good work done by Mr. Halkett and his Staff, loyally supported by the whole body of our employees.

The report and accounts were unanimously adopted, and the retiring Directors re-elected.

TRADE NOTES

Spencer-Bonecourt District Engineer.

Messrs. Spencer-Bonecourt inform us that when Messrs. Ward-Owen and Co., of Liverpool, ceased to represent their interests, they appointed as their District Engineer for Yorkshire, Lancashire, Cheshire, and North Wales Mr. G. F. Ward, Grosvenor Mansions, Deansgate, Manchester. Mr. Ward was originally a partner in Messrs. Ward, Owen, & Co., and he has therefore had many years' experience with Spencer-Bonecourt products.

Armouring with Woven Wire Mesh.

Rubber hose, cables, glass vessels, and similar articles when required for service under exacting conditions, particularly as regards abrasion, shock, varying pressures, or attack from rodents, can be protected in an economical and presentable form by "Prana" woven wire mesh armouring. Sparklets, Ltd., the manufacturers of "Prana" woven wire coverings, have installed modern plant capable of meeting the most exacting requirements of finish, flexibility, elasticity, and strength. Steel, copper, phosphor-bronze, and tugum wires are, perhaps, those for which there is the greatest demand, but providing the material desired is available as drawn wire and suitable for weaving there is virtually no limit to the metals which may be used for this purpose.

This firm claim that their long experience and resources of plant place them in a prominent position for dealing with problems of protection where woven wire mesh will serve.

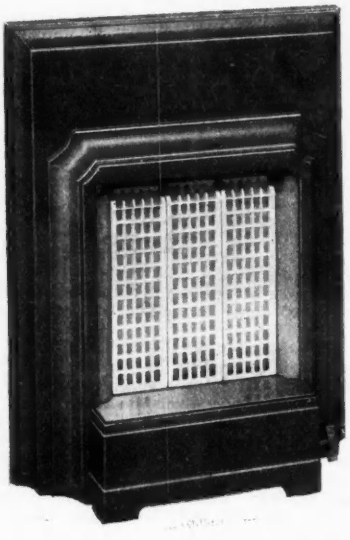
A New Industry for Clydeside.

The plans for a new £40,000 factory to be built by Messrs. Turners Asbestos Cement Company at Dalmuir were approved by the Clydebank Dean of Guild Court on Feb. 21. The site is the former shipyard of William Beardmore & Co., on the North Bank of the Clyde, which was dismantled in 1931 under the shipbuilding rationalization scheme. Demolition work is now in progress and the 20-acre site is being rapidly cleared for the erection of the new factory. When reconditioned, the building will consist of five bays, 50 ft. wide and over 1,000 ft. long. The reconstruction and equipment of the works, with new plant for the manufacture of asbestos-cement pressure pipes and roofing materials, will cost £200,000, and it is anticipated that production will commence about June 1 this year. The new factory will give employment to approximately 350 operatives in the early stages, and it is anticipated that within a year this number will be increased to 500. Messrs. Turners Asbestos Cement Company, whose Head Office is at Trafford Park, Manchester, is a branch of Turner & Newall, Ltd.

Mr. S. H. Kirkwood is the Scottish Sales Manager of Messrs. Turners Asbestos Cement Company's Glasgow office at Castle Chambers, 65, Renfield Street, Glasgow. Telephone: Douglas 2006.

An Interesting "Portcullis" Development.

A gas fire which should attract a good deal of attention in the Industry is the latest development by Bratt Colbran, Ltd. Designed and produced by the firm this fire—which is known as the "Lancelot"—embodies a number of noteworthy features.



In appearance it has in every way the architectural lines of all Bratt Colbran cast fires, but has been produced in stamped steel to meet the Industry's demand for a fire possessing the features of both lightness and durability, at a price that is well within reach of the public purse.

While only made in the 3-unit size, its technical efficiency is such that it is capable of heating large rooms, and, being a completely independent model, possesses unlimited scope in application.

As opposed to the normal 30 cu.ft. per hr. rating of a 3-unit "Portcullis" fire, this fire is rated at 40 cu.ft. per hr. (C.V. 500)

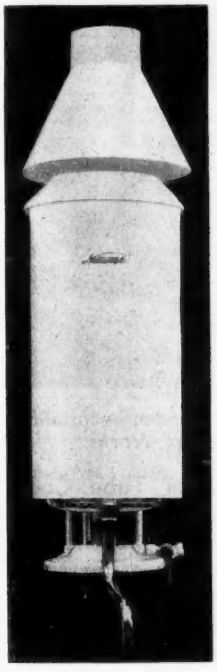
full on, but has incorporated a device permitting the graduated reduction of gas rate. This device is controlled by the tap which can be set to three intermediate positions, identified by audible "clicks," giving the following approximate rates:

Full on	.. ..	40 cu.ft. per hour
1st click	.. ..	34 " " " approx.
2nd "	.. ..	27 " " " "
3rd "	.. ..	20 " " " "

There is practically no diminution of luminosity of the radiants when the tap is turned down to the third "click"—the radiants remaining luminous to the top, thus eliminating the uninteresting and chilling appearance of the normal gas fire when the tap is turned down.

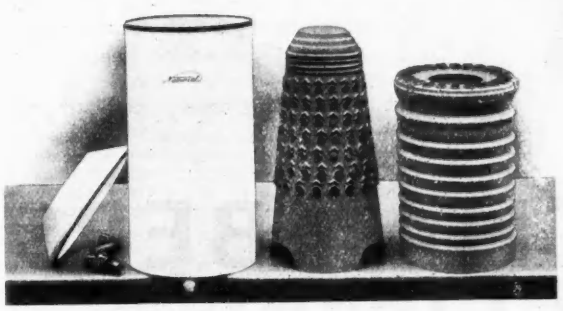
A New Bath Water Heater.

Last week we inspected a new instantaneous gas water heater for use for bath purposes. It is a single-point heater of neat design finished in white enamel with chromium-plated fittings. The connexions, both gas and water, are inconspicuously tucked away, and the standard model is equipped with a volume gas governor, a safety pilot, and an automatic water valve. The gas consumption is 180 cu.ft. of 500 B.Th.U. gas per hr. and the flow is 3 gallons per minute.



We were impressed very favourably with the simplicity of construction of this bath water heater, which is designed for low cost of production and for low maintenance cost in use on the district. Maintenance costs are likely to be at a minimum with this appliance. It is, it should be explained, of the "open" type. In other words, the products of combustion and the water are in contact when the heater is in use. The combustion chamber and the dome over which the water flows are constructed of aluminium, and the appliance is equally suitable for hard or soft water. An effective baffler is an integral part of the appliance.

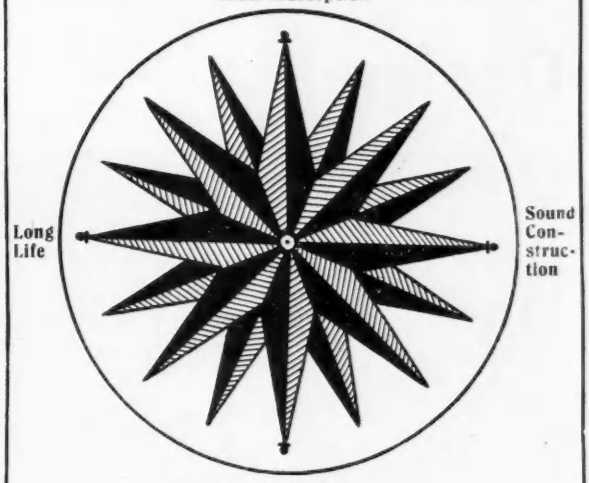
The illustration below is of the heater dismantled. It shows the two aluminium heat exchangers when removed from the enamelled jacket. For dismantling it is only necessary to lift the body off the burner; there are no nuts or screws. The Gas Industry should find this new appliance—it is named the "National," and is manufactured by the National Gas Water Heater Company, Ltd.—a further help towards extending the water heating load.



Showing the Component Parts of the "National" Heater.

All the Cardinal Points

Small Absorption



Accurate Registration

ARE CAREFULLY WATCHED IN THE CONSTRUCTION OF OUR METERS

OUR HIGH CAPACITY

METERS

are specially designed for their work and register accurately, with a minimum of pressure loss under

The most severe tests

MANY SPECIAL AND DISTINCTIVE FEATURES ARE INCORPORATED AND ARE WELL WORTH YOUR EXAMINATION.

SAWER & PURVES

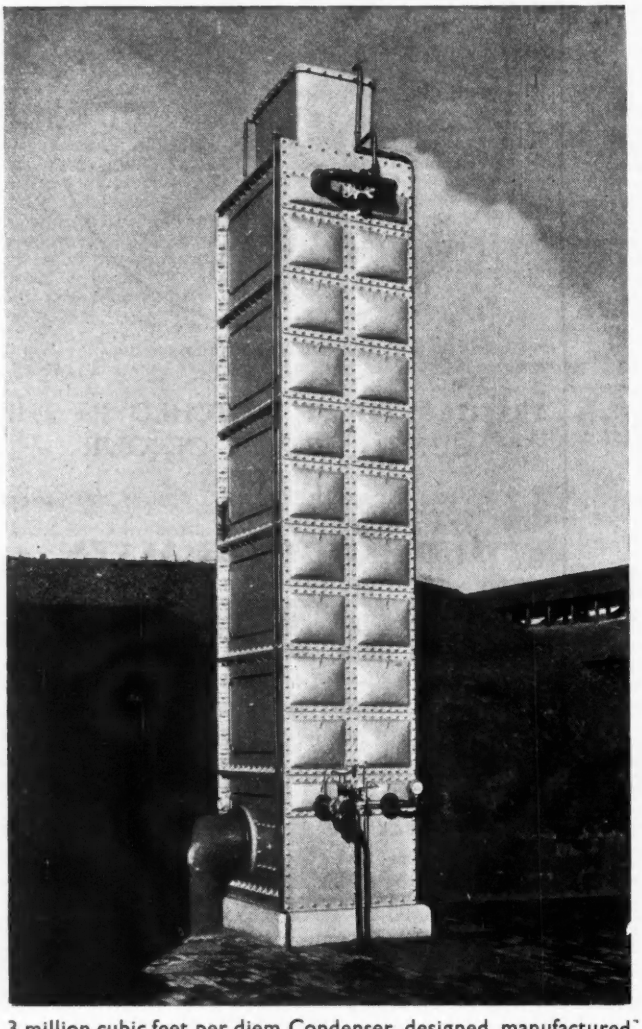
(BRANCH OF METERS LTD.)

DERBY ROAD,
WATFORD.
Phone: 2645.

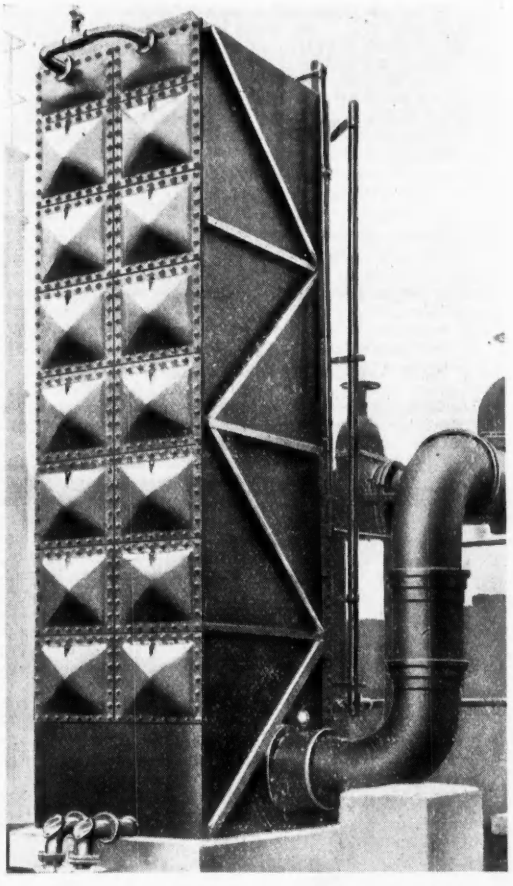
Radford Meter Works,
Radford Road,
NOTTINGHAM.
Phone: 75202.

Nelson Meter Works,
Miles Platting,
MANCHESTER.
Phone: 2289 Collyhurst.

A Revolution in GAS CONDENSER Design



3 million cubic feet per diem Condenser, designed, manufactured and erected by us for the West Bromwich Gas Department.



1½ million cubic feet per diem Condenser installed by us at the East Hull Gas Works.

The Thorncliffe Horizontal Tube Condenser incorporates the patent double gas deflector plates ensuring absence of slip and dead space, at the same time rendering the transfer of heat from adjacent passes impossible.

These features give definite reduction in water consumption as compared with previous types.

The incorporation of automatic temperature control maintains a constant gas outlet temperature.

The Condensers can be of welded steel or cast iron construction.

They combine a pleasing appearance with low capital cost.

Write for full particulars and specification to:

NEWTON CHAMBERS THORNCLIFFE & CO. LTD.

Nr. SHEFFIELD

Markets and Manufactures

Current Sales of Gas Products

The London Market

March 14.

There are no alterations to record in the prices of Tar Products in the London market, which remain as follows:

Pitch, 36s. to 37s. per ton f.o.b.
Creosote, about 5¾d.
Refined tar, 3½d.
Pure toluole, 2s. 1d. to 2s. 2d.
Pure benzole, 1s. 8d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine, 10s. to 11s.
All per gallon naked at makers' works.

The Provinces

March 14.

Crude Gas-Works Tar, 22s. to 27s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. to 3s. 3d. Naphthalene, £13 10s. to £16. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *March* 12.

Business is still rather quiet, although prices show no material alteration during the week.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is easy at 28s. to 30s. per ton, f.o.b. for export, and round 28s. per ton *ex* works in bulk for home trade.

Refined tar.—Prices are maintained at 3½d. to 4d. per gallon for home trade, and 3d. to 3¼d. per gallon for export, both free on rails makers' works in buyers' packages.

Creosote oil.—Only a moderate amount of business is being conducted, but prices are steady as follows: Specification oil, 5d. to 5¼d.; low gravity, 6¼d. to 6¾d.; neutral oil, 5d. to 5¼d. per gallon, all *ex* works in bulk.

Cresylic acid.—There is very little trade and values are more or less nominal as under: Pale, 97/99%, 2s. 6d. to 2s. 8d. per gallon; dark, 97/99%, 2s. 4d. to 2s. 6d. per gallon; and pale, 99/100%, 2s. 9d. to 3s. 3d. per gallon; according to quality, all *ex* works in buyers' packages.

Crude naphtha.—Only small supplies are available, which are valued at 6d. to 6¼d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 5d. to 1s. 6d. per gallon, and 90/190 grade is 1s. 1d. to 1s. 2d. per gallon.

Motor benzole continues steady at 1s. 4½d. per gallon.

Pyridine.—Supplies can be secured at 12s. to 12s. 6d. per gallon for 90/160 grade, and 13s. to 14s. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9	to	0	9½	per gall. at works
Motor " ..	1	2½	"	1	3	" " "
90% " ..	1	3½	"	1	4	" " "
Pure " ..	1	7½	"	1	8	" " "

Contracts Advertised To-Day

Connersville, or similar Type, Meter.
Stoke-on-Trent Gas Department. [p. 834.]

High Pressure Governors, and Valves.
Stoke-on-Trent Gas Department. [p. 834.]

Hot Coke Telpher Chassis.
Wigan Gas Department. [p. 834.]

Single Lift Gasholder.
Municipal Commissioners of Singapore. [p. 834.]

Steel Main and Fittings.
Stoke-on-Trent Gas Department. [p. 834.]

Dividend Announcement

Midland Tar Distillers.—Interim of 2½%, free of tax (same), on Ordinary shares. Books closed March 19-31. Warrants posted March 31.

Applications for Patents

BARRALET, J. H., AND NEW GEYSERS (1931), LTD.—Geysers. No. 1702.

BARRALET, J. H., AND NEW GEYSERS (1931), LTD.—Geysers. No. 4585.

GAS LIGHT AND COKE COMPANY, PRIGG, J. A., AND VOICE, E. W.—Catalytic ignition devices for gas burners. No. 1197.

JOY, B. C.—Domestic gas heating appliances. No. 4331.

LOWE, J. S.—Gas-fired unit heating apparatus. No. 1451.

MARKHAM, A. J.—Gas meters. No. 4308.

METERS, LTD., AND SIDES, H.—Gas meters. Nos. 1468, 1469.

OXLEY ENGINEERING COMPANY, LTD., AND HOLLIS, H. H.—Crude roller carriages for gasholders. No. 4698.

PARKINSON STOVE COMPANY, LTD., BARNES, H. V., AND ADAMS, R. K.—Gas-heated water circulator. No. 4126.

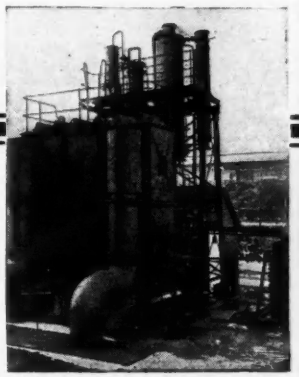
PARKINSON STOVE COMPANY, LTD., COX, F. L., AND SMITH, R.E.—Lighting devices for gas cookers. No. 1255.

PARKINSON STOVE COMPANY, LTD., TAYLOR, H. G., AND SMITH, R. E.—Burners for gas fires. No. 4127.

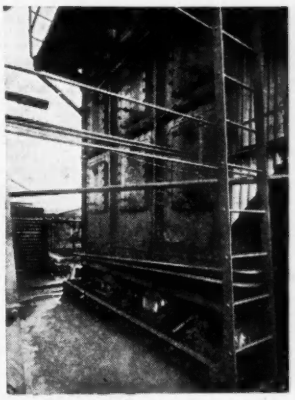
STOTT & CO. (ENGINEERS), LTD., J., STOTT, V. H., SCHOFIELD, L., AND STOTT, R. E.—Control valves for gas rings. No. 3656.

TOOGOOD, H. J.—Grates for breeze producers. No. 3569.

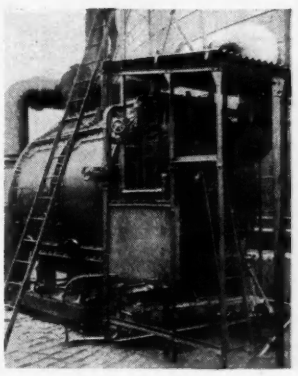
UNITED GAS INDUSTRIES, LTD., SMITH, E. W., AND CHARLES, A.—Prepayment mechanism for gas meters. No. 3913.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

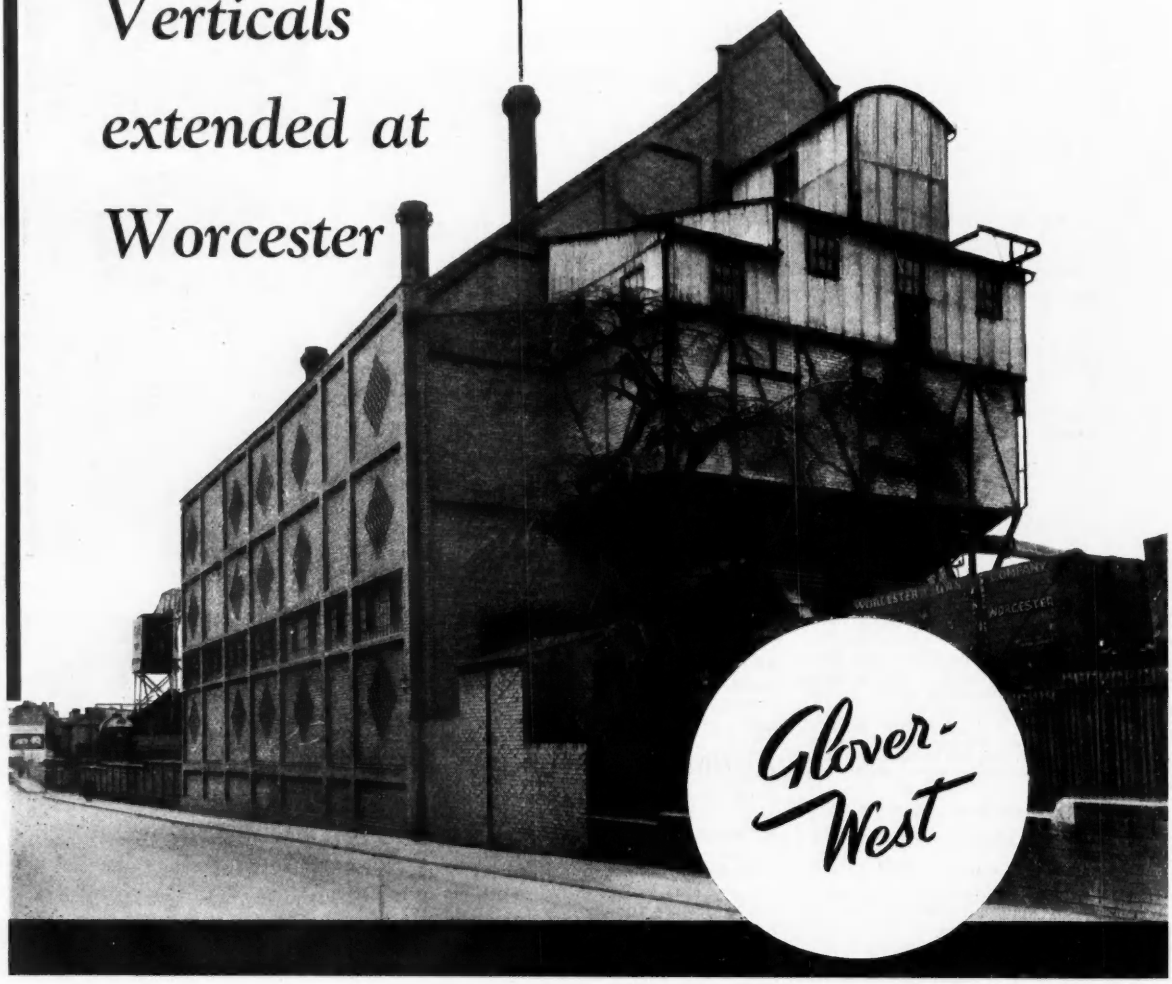
Permac
METAL-TO-METAL JOINTING MATERIAL

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil—screw pipe or flange. Send for particulars.

Manufactured only by

Thomas & Bishop LTD.
37, Tabernacle Street, LONDON, E.C.2
Telephone: Clerkenwell 3351 (2 lines)

Glover-West Verticals extended at Worcester



The illustration shows the Glover-West vertical retort house at the works of the Worcester New Gaslight Company with the extension recently added. The original plant of 12 retorts was put to work in 1934. Its capacity is considerably more than doubled by the new bench of 16 retorts with waste-heat recovery equipment and pressure producers.

CONTINUOUS VERTICAL RETORTS

418 plants built or ordered in 24 countries

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C.2

GAS STOCKS AND SHARES

Stock Markets began the new Account last week without any signs of increased business. On Tuesday and Wednesday, however, it really looked as if the long-hoped-for recovery was about to commence, but the news from Central Europe soon put an end to this, and business once more came to a halt. The only bright spot was the home rail section, where quotations on the whole closed fractionally higher. Industrials found little support, and prices were marked down under the pressure of comparatively small sales.

The Gas market opened up quietly, though the volume of business increased daily until Friday, and several stocks were well supported. Gas Light units had a good following, and a demand set in for Imperial Continental, the margin of the latter widening to give a net advance on the week of 4½ points. Other than a few more *ex* div. markings, the only fall in the Official List occurred in Gas Consolidation ordinary shares, which closed 6d. lower at 20s. A feature in the Supplementary List was the sharp rise of 14 points in Bognor new 7% max. to 154½, business being recorded at 153. At the Provincial Exchanges, Newcastle units reacted 6d. to 22s. 6d. and Liverpool ordinary hardened a fraction.

At the time of writing there is a good supply of ordinary and preference issues available, but the list of debenture stocks on offer is very limited. Two small parcels among the latter to yield 4% are those of East Hull and Lea Bridge 4%, both being perpetual, while a large block of United Kingdom Gas Corporation 3½% is available at 98¼ *ex* div. to give a gross yield of £3 11s. 3d., or £3 14s. after allowing for redemption.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Mar. 11.	Rise or Fall on Week.
1,767,439	Mar. 7	8	8	Alliance & Dublin Ord. ...	155—160*	−2
374,000	Dec. 13	4	4	Do. 4 p.c. Deb. ...	95—100	...
558,190	Nov. 15	5	5	Asscd. Gas & Water U'd'ts Ord	18/6—20/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
216,041	,,	—	§-/4	Do 4 p.c. Red. Cum. Pref.	19/—20/-	...
278,590	,,	§-/2	4	Do. 4 p.c. Irred. Cum. Pref.	17/—19/-	...
500,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99*	−1
558,890	Feb. 21	7	7	Barnet Ord. 7 p.c.	158—163*	...
300,000	Oct. 4	1/9†	1/4†	Bombay, Ltd.	26/—28/-	...
179,915	Feb. 21	9½	9½	Bournemouth sliding scale ...	197—202	...
590,407	,,	7	7	Do. 7 p.c. max. ...	156—161	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	131—136	...
50,000	Dec. 13	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Feb. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	147—152	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	131—136	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130	...
855,000	Mar. 7	7	8	British Ord.	138—143*	−2
100,000	Dec. 13	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
100,000	22 May '33	6	4	Cape Town, Ltd.	1½—2½	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	Dec. 13	4½	4½	Do. 4½ p.c. Deb. ...	70—75	...
626,860	Feb. 7	6	6	Cardiff Con. Ord.	120—125	...
237,860	Dec. 13	5	5	Do. 5 p.c. Red. Deb.	106—111	...
98,936	Oct. 4	2/-	2/-	Colombo Ord....	1⅝—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.	23/6—25/6	...
739,453	Oct. 4	-/11-48	-/11-48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...
1,775,005	Feb. 7	5	5	Commercial Ord.	83—88	...
620,000	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78	...
286,344	Feb. 7	5	5	Do. 5 p.c. Deb. ...	113—118	...
807,560	Feb. 21	7	7	Croydon sliding scale... ...	138—143	...
644,590	,,	5	5	Do max. div.	107—112	...
620,385	Dec. 13	5	5	Do. 5 p.c. Deb.	115—120	...
239,000	Feb. 7	5	5	East Hull Ord. 5 p.c.... ...	96—101	...
185,355	Feb. 21	6	6	East Surrey Ord. 5 p.c. ...	118—123	...
176,211	Dec. 13	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 15	7	4	Gas Consolidation Ord. ...	19/—21/-	—/6
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6	...
19,223,324	Feb. 7	5⅝	5⅝	Gas Light & Coke Ord. ...	23/—24/-a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	83—86	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref.	100—103	...
2,993,000	Jan. 17	...	3¾	Do. 3¾ p.c. Red. Pref.	101½—103½	...
8,602,497	Nov. 29	3	3	Do. 3 p.c. Con. Deb.	80—83	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb.	113—116	...
3,500,000	,,	4¼	4¼	Do. 4¼ p.c. Red. Deb.	111½—114½	...
700,000	Mar. 7	3¼	3¼	Do. 3¼ p.c. Red. Deb.	97—100*	−1
270,466	Feb. 21	6	6	Harrogate New Cons. ...	118—123*	...
157,500	April 5	1/2⅛	1/2⅛	Hong Kong and China Ord	⅜—1	...
213,200	Feb. 7	6	6	Hornsey Con. 3½ p.c. ...	116—121	...
5,600,000	Nov. 1	12	8	Imperial Continental Cap. ...	120—130	+4½
223,130	Jan. 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93	...
285,242	Feb. 21	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172	...
11,751	Feb. 21	8	10	Maidstone 5 p.c. Cap.... ...	175—185	...
63,480	Dec. 13	3	3	Do. 3 p.c. Deb. ...	70—75	...
75,000	Nov. 29	†10	†10	Malta & Mediterranean ...	145—155	...
				Metropolitan (of Melbourne)		...
392,000	Oct. 1	5½	5½	5½ p.c. Red. Deb.	100—103	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Mar. 11.	Rise or Fall on Week.
231,977	Feb. 21	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...
360,075	Dec. 13	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	Nov. 15	†9	†6	Montevideo, Ltd.	75—80	...
250,000	Mar. 7	7½	7½	North Middlesex 6 p.c. Con.	145—150*	−2
396,160	Feb. 7	5	5	Northampton 5 p.c. max. ...	108—113	...
300,000	Oct. 18	†7	†9	Oriental, Ltd.	153—158	...
468,537	Dec. 13	8	8	Plymouth & Stonehouse 5 p.c.	154—159	...
621,667	Feb. 7	8½	8½	Portsmouth & Gosport Cons.	161—165	...
241,446	,,	5	5	Do. 5 p.c. max. ...	102—107	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
247,966	Dec. 13	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	Jan. 17	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
15,000	Sept. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	9—9½	...
441,275	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	1/—23/-	...
460,810	,,	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	1/6—21/6	...
133,201	Feb. 7	8½	5	Shrewsbury 5 p.c. Ord. ...	128—133	...
9,000	June 7	4	4	South African Ord.	3¾—4¾	...
1,371,752	Sept. 6	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	1/—25/-	...
871,636	Mar. 7	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	1/—22/-*	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	1/—20/-*	...
450,000	Feb. 7	4	4	Do. 4 p.c. Deb.	98—101	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
6,709,895	Feb. 7	6	5	South Met. Ord.	105—108	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pf. ...	130—135	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pf. ...	97—100	...
1,895,445	Dec. 13	3	3	Do. 3 p.c. Deb.	78—81	...
1,000,000	Jan. 17	5	5	Do. 5 p.c. Red. Deb....	109—112	...
1,543,795	Feb. 7	6	6	South Suburban Ord. 5 p.c.	118—123	...
512,825	,,	5	5	Do. 5 p.c. Pref....	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref....	95—100	...
250,000	,,	§18/9	3¾	Do. 3¾ p.c. Red. Pref.	98—101	...
888,587	Dec. 13	5	5	Do. 5 p.c. Deb....	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb....	97—100	...
200,000	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...
427,859	Nov. 1	1/2⅛	9⅛	S. Western Gas & Water Ord.	18/6—20/6	...
160,523	,,	-/10⅛	-/10⅛	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...
110,000	Dec. 13	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...
750,541	Feb. 7	5	5½	Southampton Ord. 5 p.c. ...	109—114	...
148,836	Dec. 13	4	4	Do. 4 p.c. Deb. ...	96—101	...
350,000	Feb. 7	5½	5½	Swansea 5½ p.c. Red. Pref. ...	108—113	...
94,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Feb. 7	6¾	6¾	Tottenham and District Ord.	128—133	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref....	119—124	...
62,235	,,	5	5	Do. 5 p.c. Pref....	108—113	...
371,850	Dec. 13	4	4	Do. 4 p.c. Deb....	97—102	...
85,701	July 19	‡6	6	Tuscan 6 p.c. Red. Deb.	96—101	...
888,629	Oct. 4	6	4	U. Kingdom Gas Cor. Ord....	19/—21/-	...
937,743	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...
500,000	,,	...	-/1·15	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	Dec. 13	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	16/6—18/6	...
1,000,000	Mar. 7	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	96—99*	...
373,939	Feb. 7	7	7	Uxbridge, &c., 5 p.c.	136—141	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Feb. 7	7	7	Wandsworth Consolidated ...	137—142	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	96—101	...
1,343,964	Dec. 13	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
558,342	Feb. 7	7	7	Watford and St. Albans Ord.	137—142	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
200,000	,,	5½	5½	Do. 5½ p.c Pref. ...	120—125	...
200,000	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	97—102	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	95—100	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Mar. 11.	Rise or Fall on Week.
202,152	Sept. 6	25/–b	5	Ascot Ord.	105—110	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 23	...	-/4½	Associated Utilities 4 p.c. Pref.	16/6—18/6	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb....	95—100	...
17,000	Feb. 21	8	8	Bognor Orig. Ord. 'A' ...	157—167	...
62,210	,,	8	8	Do. New Addl. 'A' ...	157—167	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	152—157	+14
37,440	Feb. 7	10	10	Cam. Univ. & Town10 p.c. max.	190—200	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	Feb. 7	4½	4½	Cardiff 4½ p.c. Pref. ...	95—100	...
150,000	Feb. 21	4	4	Croydon 4 p.c. Pref.	97—101	...
130,000	Dec. 13	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Mar. 7	7½	8½	Eastbourne 'A' 5 p.c. ...	155—160*	—3
198,000	,,	6	7	Do. 'B' 3½ p.c.	126—131*	—2
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112*	—1
130,000	Dec. 13	5	5	Do. 5 p.c. Deb.	113—118	...
24,000	Feb. 21	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Feb. 21	8	9	Guildford Cons.	167—172	...
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113	...
68,250	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
156,600	Feb. 21	7½	7½	Hampton Court Cons. ...	142—152	...
80,000	Feb. 21	4	4	Lea Bridge 4 p.c. Pref ...	94—99	...
60,000	,,	6	6	Do. 6 p.c. Pref. ...	123—128	...
94,876	Dec. 13	4	4	Do. 4 p.c. Deb. ...	97—100	...
73,620	Mar. 7	8¾	8¾	Luton Cons. 'A'	160—165*	—3
107,960	Sept. 20	5½	4	Mid Kent Ord. ...	8¾—9¾	...
230,940	Feb. 7	10	10	Oxford & District Ord. ...	202—207	...
47,112	,,	5	5	Do. 5 p.c. Pref.	10¢—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	Nov. 15	7½	7½	Peterborough Ord.	158—163	...
64,990	Mar. 7	6½	7½	Redditch Ord....	122—132*	—3
166,850	Feb. 7	8	8	Romford Ord....	148—153	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...
25,570	Feb. 7	5½	5½	Rugby 5½ p.c. Pref.	123—128	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
10,950	Feb. 21	8	8	Ryde Ord.	140—150	...
270,086	Sept. 6	7	7	Slough Ord.	133—138	...
21,000	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/–	...
28,866	Mar. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6*	...
137,730	Feb. 21	7	7	Southgate & Dist. 7 p.c. max.	138—143	...
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115	...
117,228	Feb. 7	5	7	Swindon Cons.	104—109	...
60,425	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 13	5	5	Torquay and Paignton 5 p.c. Pf.	108—113	...
33,858	Nov. 15	...	-/2·70c	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	20/—22/–	...
130,000	Feb. 7	5	8	Wakefield Ord.	118—123	...
81,650	,,	5	5	Do. 5 p.c. max.	101—106	...
82,000	Feb. 21	6	6	Weymouth Ord.	110—115	...
98,384	Feb. 7	6	6	Wolverhampton 6 p.c. Pref....	118—123	...
160,000	Dec. 13	5½	5½	Do. 5½ p.c. Rd. Db.	107—112	...
90,000	Dec. 13	5	5	York 5 p.c. Red. Deb.... ...	104—109	...
133,640	Feb. 21	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	126—131	...
120,000	,,	5	5	Do. 5 p.c. Pref.	106—111	...
35,000	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	121—126	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Mar. 11.	Rise or Fall on Week.
347,756	Feb. 7	5	6	Bath Cons.	118—120	...
1,667,250	Feb. 7	5	5	Bristol, 5 p.c. max.	117½—118½	—½
120,420	Dec. 13	4	4	Do. 1st 4 p.c. Deb. ...	100—102	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Feb. 21	5	5	Newport (Mon.) 5 p.c. max....	99—101	...
13,200	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11½—12½	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11½—12½	...
140,778	Feb. 7	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	Jan. 3	4	4	Do. 4 p.c. Deb.	94½—96½	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	154—157	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Mar. 11.	Rise or Fall on Week.
157,150	Feb. 7	5	6½	Chester 5 p.c. Ord.	103½—107½	...
92,500	Dec. 13	4	4	Do. 4 p.c. Pref.	96—100	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.... ...	88—91	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 21	6	6	Liverpool 5 p.c. Ord.... ...	123¾—124¾	+¾
245,500	Dec. 13	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...
306,083	Jan. 17	4	4	Do. 4 p.c. Deb. ...	100—102	...
106,280	Feb. 7	10	10	Preston 'A' 10 p.c.	202—212	...
188,219	,,	7	7	Do. 'B' 7 p.c.	144—154	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Mar. 11.	Rise or Fall on Week.
122,577	Feb. 21	8	8	Blyth 5 p.c. Ord.	163½—164½*	...
732,000	Feb. 21	5	5	Hartlepool G. & W. Cn. & New	110—112*	...
2,061,315	Feb. 7	5	5¾	Newcastle & Gateshead Con.	22/3—22/9a	—/6
682,856	,,	4	4	Do. 4 p.c. Pref. ...	98—100	+1
776,706	Jan. 3	3½	3½	Do. 3½ p.c. Deb. ...	91½—92½	+1½
277,285	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...
332,351	Feb. 7	6	6	Sunderland 6 p.c. max. ...	137—139	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Mar. 11.	Rise or Fall on Week.
542,270	Feb. 21	6	9	Derby Con.	135—145	...
55,000	Dec. 13	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 13	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Mar. 11.	Rise or Fall on Week.
10,000	Feb. 21	10	10	Great Grimsby 'A' Ord. ...	210—220	...
6,500	,,	10	10	Do. 'B' Ord. ...	210—220	...
79,000	,,	10	10	Do. 'C' Ord. ...	205—210	...
1,806,339	Feb. 21	6½	6½	Sheffield Cons.	142—145	...
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	100—103	...

a The quotation is per £1 of Stock. § Actual for Quarter. c Actual. * Ex div.

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